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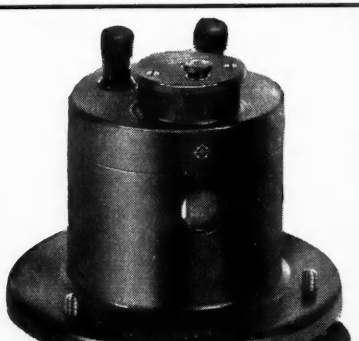

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ELECTRICAL REVIEW

Vol. CXLVII No. 3794 11TH AUGUST, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

First Things First

POWER PRODUCTION METHODS

ESTIMATES of natural resources available for the production of electricity that were presented at the fourth World Power Conference prompt speculation as to how an unabated growth of electrical demand will be met in a remote future. In this there is, however, a risk that spectacular possibilities, such as the development of nuclear fission, may distract attention from the need to make the utmost of means more immediately to hand and Sir Harold Hartley's several warnings to that effect are much to the point. They are also in accordance with the view expressed by Sir Henry Tizard, at the last meeting of the British Association, that the production of power from uranium could not bring such economic benefit to the country within twenty years as would the practical application of known methods of economizing coal. That period is conveniently near to the efficient life of most electrical plant now being installed.

Present Problems

On that account the discussions most apt to the purpose dealt with trends in advanced practice, in which steam predominated. Subjects of most concern to the majority of delegates included the choice of steam conditions and the ratings of individual generating sets as determined by local conditions. Plant availability and the monetary value of reliability, reduction of the number of operating hours lost in periodic overhaul, loss of efficiency because of inconsistency in quality of coal or unsuitability of its volatile content to the type of combustion chamber, cost of transport of coal versus cost of transmission of electrical energy (partly a function of voltage) and, by no means least, the ash problem—all matters of immediate and outstanding importance —are themes for further debate and also for continued investigation.

Burning Low-grade Fuel

Boiler availability has in many countries (including our own) to be reconciled with the need to burn low-grade coal that contains a large proportion of dirt and fines, the proportion tending to grow with the increasing mechanization of mines. Efforts to burn such coal (which should be the aim) are frustrated elsewhere as well as here by price structures which, being only distantly related to calorific value and ash content, make it unprofitable to do so. Nothing transpired to raise hopes of obtaining the requisite high turbine efficiencies without the use of enormous quantities of condenser-cooling water or of massive cooling towers, thus getting rid of the serious and increasing difficulty of finding suitable power station sites.

Large-scale generation apart, there is wide scope for the development of other forms of prime mover. The gas turbine, besides having an independent field, may be used in conjunction with the steam turbine to give a higher overall heat effici-

ency. Oil engines, tidal energy, small waterfalls and wind-driven generators are examples of supplementary power sources within the W.P.C. terms of reference. The inference to be drawn from the foregoing is that everything should be done to enable applied or industrial research to catch up as far as possible with fundamental research. In the view of Sir Henry Tizard, scientific knowledge tends to be much ahead of practice and the present need is for skilled engineers. These have to achieve, not what is scientifically possible at any cost, but, as Sir Harold Hartley said, what is economically possible.

THE OUTLOOK

No immediate assessment of the probable effects of the rearmament proposals can yet be made. The Government appears to hope that the country will be able to carry the new burden without drastic reduction in our present standards of life: that it will merely involve a check upon the progress which we were making towards complete recovery from the war. This optimistic view can be sustained only by postulating greater productive efficiency. This means that any economies in capital expenditure must not be applied to electrical generating plant or industrial and agricultural electrification. Electrical expansion in other directions may be retarded, but, we hope, not seriously; it is already running at too low a rate.

PURCHASE TAX

Referring to correspondence calling for the revision of purchase tax on certain classes of goods, Mr. Leslie Gamage, as president of the Institute of Export, says in a letter to *The Times* that too much emphasis has been placed on the terms, used almost synonymously, "quality" and "luxury." He rightly points out that many essentials are burdened with a high rate of tax, particularly mentioning electric (and gas) water heaters. The idea behind punitive rates of tax is, he says, apparently that by prohibitive prices here goods will be diverted to export and that "the Government need the money." Mr. Gamage refutes the idea that export trade can be carried on independently of the home market and says that anything which discourages home sales will have ill effects upon exports. We feel that the Government must realize this, but has become too reliant upon the proceeds of purchase tax to make any significant remissions.

CONTRACTORS' REGISTRATION

In its report published in May the Working Party for the Building Industry expressed the view that "it is desirable on grounds of public health and safety to continue some form of registration in the plumbing and electrical trades." It was not clear from this what the Working Party had in mind although it seemed to be something more than the Ministry of Works registration which is merely for building licensing purposes. This is confirmed by a Ministry statement made last week that "proposals put forward by the plumbing trade about the future form of registration in the trade are being discussed with them by the Ministry of Works. Similar discussions are being arranged for electrical contracting."

WHOSE LOSS?

When a recommendation that the tender of the East Midlands Electricity Board for the erection of street lamps should be accepted was discussed by the Melton Mowbray U.D.C. an amendment was moved for the acceptance of the tender of a private firm which had quoted £47 more. The Board's tender was approved after the mover of the motion had said, according to a local paper: "I believe in private enterprise, but theirs was the lowest tender and if they do lose money on the work they can recompense themselves from the Exchequer, but it is not our concern." It is, of course, not the Exchequer, but the electricity consumer who would bear the loss, assuming that a loss occurs. However that may be we do not approve the sentiment.

"ELECTRICAL WHO'S WHO"

Brief biographies of about 2,600 leading men and women in all branches of the industry appear in the "Electrical Who's Who." Copies are obtainable from the *Electrical Review*, Dorset House, Stamford Street, London, S.E.1, or from booksellers, price 12s. 6d. (postage 7d.)

Control in Generating Stations

I.—The Part it Plays in the Operation of Modern Plant

By W. SZWANDER, Dipl. Ing. (Warsaw), A.M.I.Mech.E., M.I.E.E.*

THIS is the first of four articles which develop the thought that control problems in modern power stations deserve some special attention. Instead of being treated individually, independently from one another, they should constitute functionally interrelated components of a clearly defined concept—that of generating station control. The latter embraces all the facilities necessary for adjusting quickly the station output to the fluctuating power demands, in normal service as much as during emergencies, and—at the same time—for maintaining continuously the highest degree of safety and efficiency with economy of operation of all the plant components.

Advantages of centralization and of automatic operation of controls will be discussed side by side with the necessity always to preserve full local and manual controls, as well as the desirability to achieve the greatest possible simplicity. The control, or operating, room in a modern generating station is a real nerve centre for the whole station's operation, not merely a switchgear control-room.

Definition of Term

The term control has a very wide meaning. It covers a range of problems. Control can be local or remote, manual or automatic. Electrical engineers' interests are by no means limited to the control of electrical circuits and apparatus. Combustion control of boilers may be a good illustration of how non-electric processes can be controlled by electrical methods, at the same time constituting a vital component of a major problem of primary and direct interest to electrical engineers.

Study of the subject can be divided into three distinct stages. The first would deal with basic elements of various schemes, like the methods of controlling switchgear, starting motors, remote position control and indication, etc., with which it is not necessary to deal at present. The second stage would cover complete individual schemes, such as voltage regulation, frequency control, synchronizing, turbine and boiler control, etc., each by itself deserving separate study, but, fortunately, much information about them can be found elsewhere.

The third stage, which is the main subject of this series of articles, is the synthesis of a number of individual schemes into a logical combination which, as such only, can be considered to constitute the generating station control. The way towards a satisfactory and purposeful design leads from the analysis of needs and possibilities, through a choice of means, towards the final consideration of the selected individual requirements merged into a comprehensive efficient and economical station control system.

Three Basic Types

It is necessary to differentiate between (1) the "electric station control," mainly of switchgear, transformers, convertors, etc., combined usually with some amount of supervision or control of a subordinate section of a distribution system, (2) the actual "generating station control" comprising, in addition to the preceding, also the control of power generating plant in all its complexity, and finally (3) the "power system control" of a number of co-operating power stations supplying a system and of primary transmission lines constituting the backbone of that system. The power station control will be assumed to be subordinated to a system control centre situated outside the station. A number of alternative solutions can be applied, all satisfying more

* Chief technical assistant, Belfast Corporation Electricity Department.

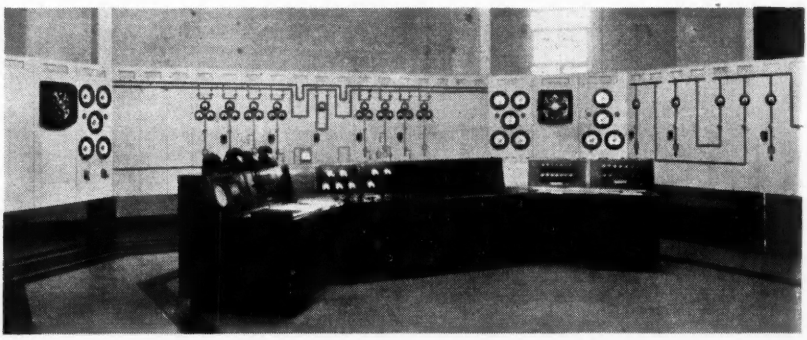
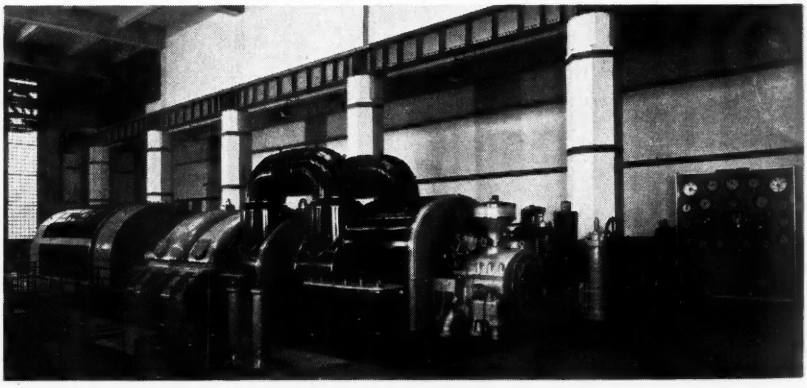


Fig. 1.—Control room in a British generating station (English Electric Co., Ltd.)

or less identical specifications of requirements. For the sake of brevity, only solutions which appear to the author to be the most representative of modern practice will be discussed. Thus some amount of personal bias cannot be avoided, but it is believed that the large degree of uniformity and similarity which can be observed in the design of modern generating stations in respect of control problems, as much as in respect of many other features, is sufficient assurance that a true enough illustration of the modern trends in station control can be presented adequately to reflect present-day practice.

In the early stages of development some thirty years ago the specific problem of station control did not exist, as such. Various components of the stations incorporated their own control facilities; no attempt was made, however, to co-ordinate them in the modern meaning of the term. The fact that the modern control room has become, to an ever-growing extent, one of the main station components is the best proof of the general recognition of the important part played by the control problems in the design and operation of modern generating stations. The reasons are obvious; on the one hand is the increasingly recognized importance of reliable and economical power supply for the modern community whose very existence depends to such a great extent on that power supply; on the other hand is

Fig. 2.—Turbine gauge board adjoining the controlled set (English Electric Co., Ltd.)



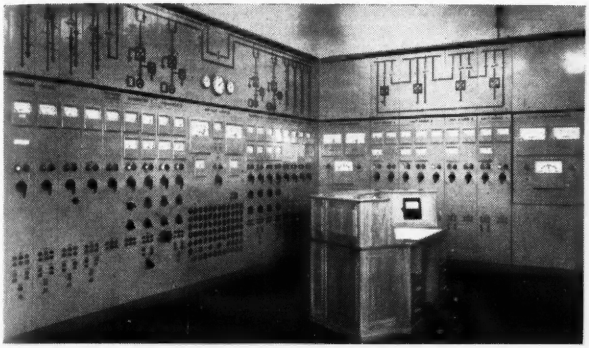
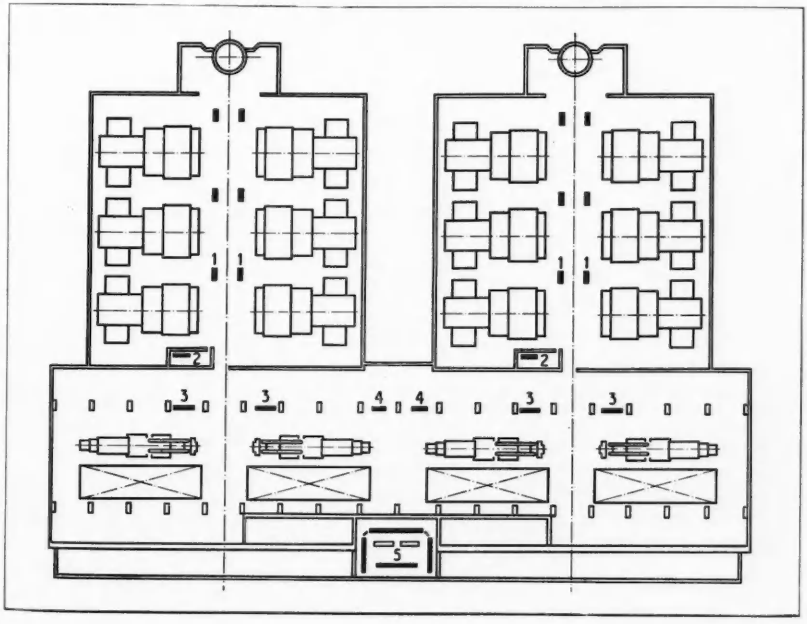


Fig. 3.—Recent design of generating station control room (G.E.C.)

the high degree of complexity reached by all the components of a modern generating station, demanding the highest standard of control facilities and skill of the operating staff to ensure the best efficiency and reliability in normal operation, to safeguard the plant against damage as well as to shorten periods of outage during disturbances. The considerable cost of high-efficiency plant calls for the provision of adequate control facilities to prevent the nullification of designed efficiencies through increased operational complications impairing the plant availability. All control schemes, however, should retain the character of means only, helping to reach goals beyond them, but never themselves becoming the objects; they should serve to alleviate difficulties arising from the complication of other plant, but they themselves should not unduly introduce

Fig. 4.—Positions of main control facilities in a typical British generating station. (1) Boiler control boards. (2) Boiler house master control panels and recorder boards. (3) Turbine boards. (4) Circulating water control panels. (5) Station control room



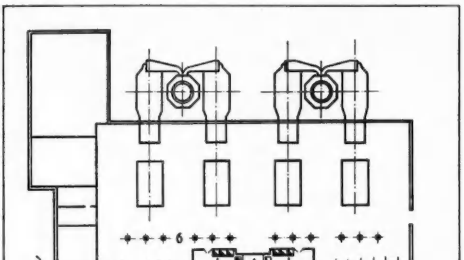


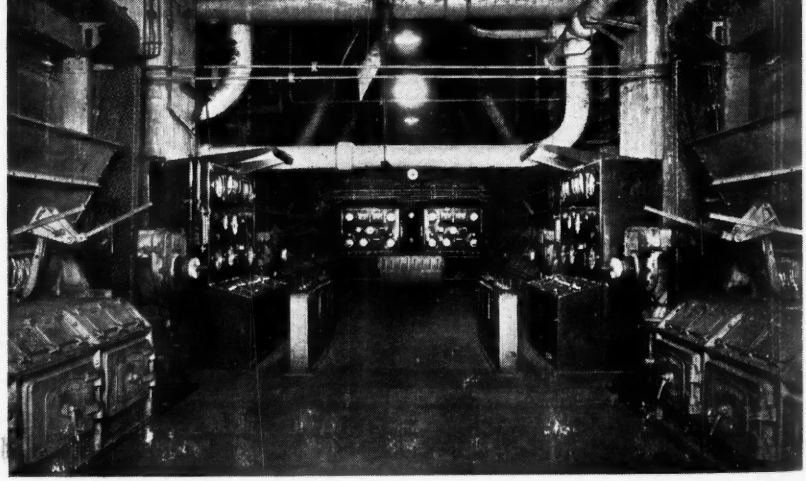
Fig. 5.—Operating room situation in a modern U.S.A. generating station. (1) Boiler control panels. (2) Turbine control panels. (3) Electrical system control panels. (4) Station auxiliary system control panels. (5) Boiler feed pumps. (6) Coal pulverizers. (7) Circulating water pumps

other, additional complications.

Control problems, as such, do not arise by themselves; they are associated with items of plant which require diverse forms of control and are thus apt to be dealt with automatically when various plant components are incorporated into a station project. Such a procedure carries the danger of resulting in a greater or lesser lack of co-ordination between various controls; individual schemes may be provided, but the concept of station control as a whole may still be missing.

It is the object of the present series of articles to stress the necessity of treating the whole of the station control as one of the major components of the generating station project. An analogy is the station auxiliary system, in which case the various auxiliary drives and their details also constitute components of individual plant items, but the need to consider at the earliest stage the whole of the auxiliary power supply and distribution as one of the major parts of the station project is already widely recognized. Without giving the control problems their proper place in the whole complex process of de-

Fig. 6.—Boiler control boards at the side of stoker-fired boilers (George Kent, Ltd.)



signing a generating station, the station control room (instead of becoming—what it ought to be—a kind of operational and supervisory nerve centre for the whole installation) may easily be reduced merely to a switchhouse actuating room with a few haphazardly brought-in additional controls or indicators.

The present discussion concerns not so much the constructional design details of control rooms (Figs 1 and 3) as their functional aspects and inter-relation of the various component control schemes in stations. The illustrations indicate the scope of the subjects under discussion and point out certain differences between approaches to the problem of station control. The typical layout of a modern British generating station (Fig. 4) with the control room adjoining, but external to, the turbine house, has individual boiler (Fig. 6) and turbine (Fig. 2) control boards near the controlled plant units. An entirely different design (Fig. 5) is representative of a number of recently built stations in the U.S.A. The station control room, which in this case should rather be called the station operating room, is situated centrally between the turbines and the boilers and contains, in addition to the usual electrical control boards, also unit control panels for all the turbines and boilers—virtually all the station controls being centralized in this room. Considerations leading to the above forms of development are to constitute the subject of the following articles of the present series.

Trolley-buses for Nottingham

Details of Electrical Equipment

SEVENTEEN of the large-seating capacity trolley-buses recently brought into service by the Nottingham Corporation have 3-axle chassis and bodies built by Brush Coachwork, Ltd., and are fitted with electrical equipment supplied by Crompton Parkinson, Ltd. The floodproof traction motors have four main compound-wound poles and commutating poles, for operation on 550 V, at a one-hour rating of 120 h.p.

A feature of the "PA" control gear, made by Allen West & Co., Ltd., is that all electrical components are mounted on one insulating base panel, the complete unit being situated beside the driver's seat on the nearside of the vehicle.

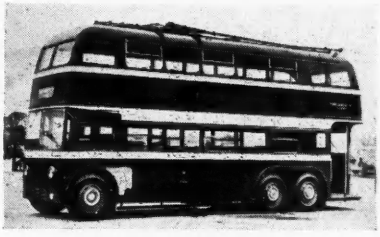
The scheme of control is designed to give controlled rheostatic braking; the compound field is used for accelerating while the shunt field is a sufficiently small proportion of the whole to avoid generating high voltages. There are ten resistance and three weak field notches for acceleration, and two stages of rheostatic braking prior to the application of the air brake. Automatic acceleration is obtained by regulating the speed of progression of the power master controller in direct relation to the load on the vehicle and the gradient.

A C.A.V. overhung generator fitted to the end of the traction motor supplies 32 V, 50 A, at the minimum speed of 690 r.p.m. Exide batteries are provided to give 64 V for battery manœuvring when coupled in series; for normal lighting and l.v. auxiliaries batteries are coupled in parallel to give 32 V.

The jointless main resistance was made by the Expanded Metal Co., Ltd., and the unit-type shunt resistances by Allen West & Co., Ltd. The current collector bases, of Brecknell and Willis manufacture, are of their latest lightweight type, fitted with 120 deg stops and radial friction control stops. The collector poles are fitted with safety ropes, coupled to the sliding shoe-type collector head, supplied by the Anti-Attrition Co.

The auxiliaries include a h.v. switch fuse panel, Haines and Sherman visual dewirement indicator with separate audible indicator, radio interference suppression unit, multi-point testing socket with testing spade, auxiliary test socket and test plug and Everett Edgcumbe speedometer generator with speedometer indicator head.

One of the new Nottingham Corporation Brush trolley-buses fitted with Crompton Parkinson electrical equipment



VIEWS on the NEWS

By REFLECTOR

A SOMEWHAT alarmist view is taken by the *Daily Record and Mail* (Glasgow) of Mr. Noel-Baker's remarks on the possibility of harnessing the tides for the generation of electricity. Quoting Professor Haldane, it points out that "tidal friction is already increasing the length of each day almost imperceptibly" and goes on to say: "When this friction is multiplied by the braking effect of great tidal power plants the day will begin to lengthen in earnest and finally the earth will stop rotating altogether." I have occasionally experienced something of this feeling, but in general I find that the days are too short.

★ ★ ★

Another problem for future generations will be provided by the Hoover Dam (U.S.A.). Measurements recently carried out by Government surveyors have shown that silt brought down by the Colorado River amounts to about 105,500 acre-feet a year. At this rate Lake Mead, the reservoir for the dam, will be filled in the year 2380. This will not put the plant out of action, however, for the Colorado will still dig a channel through the silt and the generators would then operate at about three-quarters of their present capacity.

★ ★ ★

Though heavily subsidized, rural electrification in Southern Ireland shows no signs of becoming self-supporting. In the three years or so since the scheme was started, over 25,000 consumers have been connected, yet last year the number of kWh sold in rural areas was only 13.7 million, giving a low annual average of between 500 and 600 kWh per consumer. The farmer receives other assistance in the shape of a free grant from the Department of Agriculture of half the cost of water installations, and a number of small automatic electric pumping sets have been installed, but, in the main, lighting continues to be the chief reason for taking an electricity supply. That this is not entirely due to conservatism is apparent from the interest taken in demonstrations carried out by the E.S.B. Having paid for the wiring, however, many rural dwellers cannot afford to buy apparatus, and it seems to me that hire facilities are the only solution.

★ ★ ★

The *Birmingham Post* recently reported that when a rumour spread at Stapenhill, Burton-on-Trent, that contractors preparing for the erection of the new power station in Drakelowe Park intended taking a railway embankment across a potato field, about 150 people took prams, sacks, buckets and even cars, and quickly stripped three acres of potatoes. The farmer heard of the raid too late to take preventive action. This was a most undesirable form of public enterprise.

★ ★ ★

It was suggested in the recent House of Commons debate on the British Electricity Authority's report that (a) power stations should be less elaborate and (b) the posters bearing pictures of new power stations were unnecessary. It seems to me that if simplification under (a) went far enough the stations would not be worth illustrating and so point (b) would be settled automatically.

★ ★ ★

Here is part of another example of hyperbole on the subject of Welsh water power to add to the one I quoted last week; it is from the *Caernarvon and Denbigh Herald*:—"Welshmen are captives in their own land. Other people determine our destinies for us. Indeed, our plight is sorrowful. For how long shall we meekly suffer the yoke of the aggressor? . . . Let us hope that a new generation will arise worthier than ours which will have the power to say—Wales is our possession, we will live, if necessary, die for it."

Electricity in Ireland

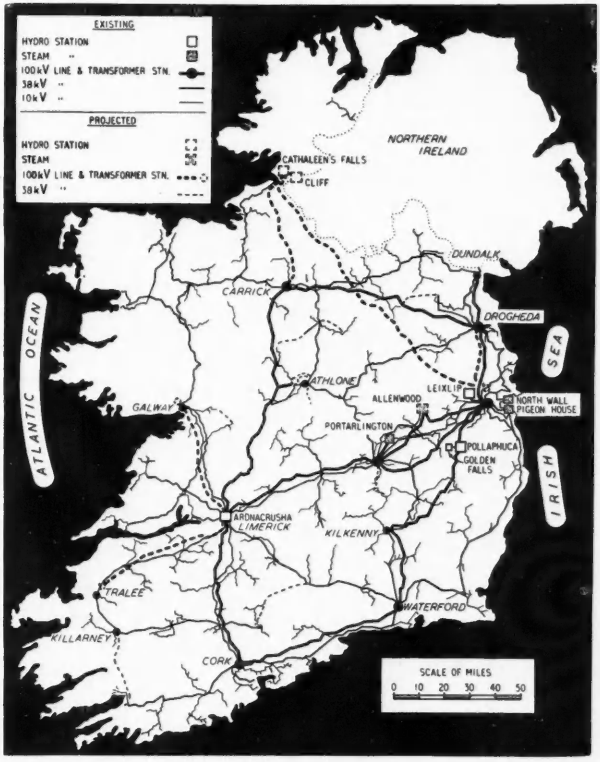
Plant Construction and Rural Schemes

THREE new power stations were placed in commission during the year, to 31st March last, covered by the latest report of the Electricity Supply Board of Ireland. They were the country's first large turf-fired station (Portarlington), the oil-fired station at North Wall, Dublin, and the Leixlip (Liffey) hydro-electric plant. Details of the Board's new construction schemes are given in the accompanying table.

Station	Fuel	Plant, MW	Date
Portarlington ...	Turf	2 × 12.5	1950 (one set)
Allenwood ...	do.	2 × 20	1952
Ferbane ...	do.	2 × 20	Prelim. stage
North Wall ...	Oil-fired	1 × 12.5	1949
Ringsend (Dublin)	Coal or oil	2 × 30	1953
Cork	do.	1 × 30	1954
Leixlip (Liffey)	Hydro	1 × 4	1949
Cliff (Erne) ...	do.	1 × 10	1950
Cathaleen's Falls (Erne) ...	do.	2 × 22.5	1951 (one set)
River Lee ...	do.	28	Prelim. stage

The report refers appreciatively to the co-operation of the Northern Ireland Ministry of Finance with regard to the drainage and water regulation of the Erne.

The year was marked by rapid progress of the rural electrification scheme. As in the case of the Northern Ireland Board (*Electrical Review*, 4th August, page 183) the main problem is that of securing an adequate return on the capital spent. Up to 31st March, £2,266,000 had been invested in rural distribution networks under the scheme, but the revenue earned from the 13.7 million kWh sold in rural areas last year was only £198,600. Experience, in fact, confirms the Board's view that a subsidy of one half of the capital cost will not be sufficient to make rural electrification self-supporting. Lighting is the consumers' main reason for taking a supply, though the use of electricity



Map of the Electricity Supply Board's system showing the principal power stations completed and under construction, together with transmission and h.v. distribution systems. In addition to the stations included, preliminary work has begun on coal or oil fired stations at Dublin (Ringsend) and Cork, a turf-fired station at Ferbane, Co. Offaly, and the River Lee development, Co. Cork

for other purposes is increasing. In seven areas where a supply has been available for two years the average consumption has risen from 500 to 700 kWh.

In the past four years 90,260 poles have been erected under the scheme (40,972 last year) and 4,573 (2,083) miles of line strung, 82 areas having been completed. The number of consumers connected so far is 25,153 (13,688 last year).

The quantity of electricity generated at the Board's stations during 1949-50, in million kWh, was 781.9, including 413.8 at Pigeon House (steam), and 284.2 at Ardnacrusha (hydro). For the previous year the comparative figures were 708.6 generated, with 364.9 at Pigeon House and 310.0 at Ardnacrusha. The maximum load rose from 187,000 kW to 217,000 kW. In addition, 1.8 million kWh was purchased from the Northern Ireland Board.

Sales increased by approximately 10 per cent to 626.2 million kWh, after allowing for a decline in traction supplies from 7.2 million to 1.6 million kWh.

Gross revenue was £4,818,477 (against £4,366,013); working expenses, £3,458,207 (£3,131,520); interest and repayment of advances, £1,120,926 (£1,022,335); and the net surplus £239,344 (£212,158). The average price per kWh sold was unchanged at 1.83d. Capital subsidies totalling £1,250,000 have so far been received in respect of rural electrification. Capital expenditure on new works under construction at the end of the year was £5,984,477, making a total of £32,701,352.

Sales of appliances increased in value by £55,081 to £300,472 (gross profit 21.1 per cent), and installation work by £9,131 to £234,644 (gross profit 21.2 per cent).

The report also contains details of the operation of the Shannon fisheries.

NEW BOOKS

Technology for Sugar Refinery Workers. By Oliver Lyle. Pp. 525; figs. 108; index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 32s.

This, the second and enlarged, edition of a book primarily intended for a limited number of readers has a much wider scope than its title might suggest. The well-written sections on sugar refining itself are likely to interest many technically minded people outside that industry, while the reasons given for the various processes are derived from fundamental scientific conceptions, which are dealt with in a way that will appeal to all needing a lucid explanation of elementary engineering principles with a lightness of literary touch.

The chapters on heat and steam, boilers, electricity production and use, and the planning and interpretation of experiments introducing the laws of probability are uniformly excellent, and are applicable to industry generally. It would have made some of the references more easy to follow if the Centrigrade scale had been translated into the Fahrenheit (in brackets) which would be more in accordance with usual boiler-house practice, e.g., the steam temperature at Barking power station is given as 450 deg C, and the C.H.U. is not so generally understood as B.Th.U. in relation to calorific value of fuel or the properties of steam.

The book is written in a common-sense way and can be recommended to those whose practical experience in engineering has not been balanced by an equivalent academic training.—C. O. B.

Are Workers Human? By Gordon Rattray Taylor. Pp. 196. Falcon Press, Crown Passage, Pall Mall, S.W.1. Price 10s 6d.

This is a study of the factors entering into the employer-employee relationship in which the author analyses motives and behaviour, and suggests means of securing contentment in industry, thereby removing grievances and improving efficiency.

Books Received

Short-Wave Radio and the Ionosphere. By T. W. Bennington. Second Edition. Pp. 138; figs. 57; index. Iliffe & Sons, Dorset House, Stamford Street, London, S.E.1. Price 10s 6d.

Co-operative Industrial Research. By Ronald S. Edwards. Pp. 285. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 20s.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE following appointments have been made in the Engineering Division of the British Broadcasting Corporation: **Mr. R. T. B. Wynn,** C.B.E., M.A., M.I.E.E., becomes deputy chief engineer, with responsibility under the chief engineer (Mr. H. Bishop) for the general control and direction of all engineering departments. **Mr. H. L. Kirke,** C.B.E., M.I.E.E., becomes assistant chief engineer, with responsibility for the co-ordination and direction of the technical work of the Research, Planning & Installation, Designs, and Equipment Departments. **Mr. W. Proctor Wilson,** C.B.E., B.Sc., M.I.E.E., succeeds Mr. Kirke as head of the Research Department and **Mr. E. C. Drewe,** M.I.E.E., becomes assistant head of the Department.

Mr. Wynn has been associated with broadcasting since the earliest days. Educated at Uppingham and Cambridge, he served with the R.A.F. during the 1914-18 war, and joined the Marconi Company in 1922. After four years at the Writtle experimental station, he left the Marconi Company to become head of the B.B.C. Engineering Information Department. In 1935 he was appointed senior superintendent engineer, with responsibility for the operation and maintenance of all B.B.C. transmitting stations and studio centres, and in 1943 he was appointed assistant chief engineer.

After serving as a signals officer during the 1914-18 war Mr. Kirke joined the Marconi Company in 1920 and was one of the pioneers of the Writtle broadcasting station. In 1924 he joined the B.B.C., and in the following year was appointed head of the Development Department, which later became the Research Department. In 1949 Mr. Kirke gave up his post of head of Research Department to become responsible for the co-ordination and direction of the technical work of the specialist departments.

Mr. Proctor Wilson joined the B.B.C. in 1927, having previously been with the Western Electric Co. He worked under Mr. Kirke at Savoy Hill until 1930 when he left to join Marconi's Wireless Telegraph Co. In 1933 he returned to the B.B.C., rejoining the Research Department, where he remained until 1939. Throughout the war Mr. Wilson served in the Signals Branch of the R.A.F., attaining the rank of group captain. In 1943 he was appointed C.B.E. (Military Division) for his services in the R.A.F. On his return to the B.B.C. in 1945 he was appointed assistant head of the Research Department, and in 1949 he became acting head of the Department.

Mr. Drewe joined the B.B.C. Research Department in 1930, after holding a regular army commission in the Royal Corps of Signals. In 1934 he transferred to the Operations and Maintenance Department, becoming engineer-in-charge of the Brookmans Park transmitting station in 1938 and a senior assistant to the superintendent engineer, transmitters, 1940. He was appointed assistant head of the Engineering Secretariat in 1942 and research manager in 1945.

Mr. P. M. Kenward has been appointed Eastern Counties representative of Berry's

Mr. R. T. B. Wynn

Mr. H. L. Kirke

Mr. W. P. Wilson

Mr. E. C. Drewe

Electric, Ltd. He was formerly with the Eastern Electricity Board (Northmet Sub-Area) at St. Albans and was responsible for the Consumers' Section of the Mains Department.

Mr. Vernon Walker, A.M.I.E.E., who until recently was deputy resident engineer and technical assistant with the Bury undertaking, has been transferred to the North Western No. 2 Sub-Divisional staff at Kearsley. Mr. Walker has written a number of papers on power station operation and efficiency and has contributed numerous articles to the technical Press on these subjects. He has also been interested in the training of power station operators and was instrumental in forming one of the first "improvement classes" with the object of furthering interest in plant operation. He is the founder and hon. secretary of the Bury Engineering Society.

Mr. V. Walker

Mr. R. C. Ford, who was until recently with the Blackburn and General Aircraft Co. at Feltham, Middlesex, has joined Multicore Solders, Ltd., as assistant works manager at their Slough factory.

Mr. J. Smith has been appointed manager of the Leeds branch of the Sun Electrical Co., Ltd., in succession to Mr. D. M. Fraser, whose death was reported in our issue of 21st July. Mr. Smith was manager of the company's Newcastle branch, but previously he had been Mr. Fraser's "right-hand man" for more than twenty years. He has been with the Sun Company for about twenty-five years.

Mr. J. Smith

Mr. J. E. Hodgkin, M.I.E.E., chairman of Barton & Sons, Ltd., has resigned and is succeeded by **Mr. A. H. Redfern.** Mr. Hodgkin will remain a director.

Mr. R. L. Fortescue, M.A. (Cantab.), A.M.I.E.E., has been appointed senior lecturer in charge of the Particle Accelerator Laboratory, the construction of which has been commenced at Queen Mary College, University of London. Since 1945 Mr. Fortescue has been working at the Atomic Energy Research Establishment at Harwell as a principal scientific officer. Machines used in nuclear physics and radio-therapy, and principles relating to the use of nuclear energy, will be studied in the new laboratory.

Mr. Sydney Kendall has resigned his position with the Radio Gramophone Development Co., Ltd., to join the Hale Electric Co., Ltd., as personal assistant to Mr. Eric Barker, managing director.

In the fifth examination of the diploma scheme of the Association of Supervising Electrical Engineers held in May, the following candidates were successful: *Electrical Installation and Maintenance:* **Mr. W. Langley** (Honours) and **Mr. R. G. Martin.** *Electrical Maintenance:* **Mr. R. P. Hilton** and **Mr. C. H. Oerton.**

Mr. A. Victor Willmott, who has been representative of Morphy Richards, Ltd., for the past thirteen years, will be joining the board of L.E.S. Distributors, Ltd., as from 1st August.

Mr. A. V. Willmott

Mr. Raymond Berry, chairman and managing director of Berry's Electric, Ltd., has been appointed chairman of the Electric Water Heater Manufacturers' Association in succession to the late Mr. F. G. Nesbitt. **Mr. F. L. Humber,** of Ferranti, Ltd., has been appointed vice-chairman.

Awards to five employees of Francis Morton & Co., Ltd., the contractors for the structural steelwork for the extensions at the Clarence Dock power station, were announced in the *London Gazette* on 1st August for the part they played in the rescue of a colleague who fell and became lodged in an unconscious state on the structural steelwork on 6th June. **Mr. J. Tough,** foreman steel erector and **Mr. R. Mason,** chargehand steel erector, receive the George Medal and the other three employees receive the King's commendation for brave conduct.

Mr. J. S. Smith, who has been on the head office staff of the Rheostatic Co., Ltd., for a number of years, has been appointed resident engineer for the Midland area and takes charge of the Birmingham office.

Dame Caroline Haslett was last week elected president of the International Federation of Business and Professional Women, which held its fifth congress in London, attended by 2,500 delegates from twenty nations. Among the many organizations which arranged receptions for the

delegates was the E.A.W. Dame Caroline Haslett is the first Englishwoman to be elected president of the Federation.

Mr. Stanley A. Coleman has been appointed sales manager to the Queensbury Engineering Co., Ltd., Stanmore. Mr. Coleman has had over 40 years in the electric fittings and sign industry. He was for many years manager of the Fitting and Sign Department of the Sun Electrical Co., a director of Best & Lloyd, Ltd., and during the war was with the Northmet Power Co.

Mr. A. Hosken, who has for some years managed the Leicester branch of the Simplex Electric Co., Ltd., has been appointed manager of the company's Birmingham branch. Apart from war service in the Middle East, Italy and France, Mr. Hosken has been with Simplex since 1930. The Birmingham branch office and showroom is at 40, Easy Row, Birmingham.

Mr. A. Hosken

Mr. W. J. Terry, chairman and managing director, recently made presentations to 113 employees of **Frederick Smith & Co.,** and the **Vactite Wire Co., Ltd.,** who had completed 25 years' or more service. The presentation took the form of a long service medal and a gift of savings tokens. Mr. Terry was supported by Mr. H. F. Smith, Mr. G. E. Jewell, Mr. F. W. Freeman and Mr. G. W. Child, general manager. At the ceremony Mr. Child presented to Mr. Terry, in respect of his 31 years' service, two long-service medals, one on behalf of Frederick Smith & Co., and the other on behalf of the Vactite Wire Co.

Mr. G. Brinsley, of Johnson & Phillips, Ltd., was last week presented with a token of appreciation of his fifty years' service with the company. The token took the form of a silver cigarette box suitably inscribed. Mr. Brinsley, who will celebrate his sixty-fifth birthday on 24th August, commenced his career with Johnson & Phillips at the age of fourteen.

Mr. H. G. Campbell, assistant managing director of the Benjamin Electric, Ltd., has been appointed joint managing director of the company.

Mr. A. Lockwood, who is already a part-time member of the Southern Electricity Board, has been appointed chairman of the Southern Electricity Consultative Council in succession to Sir Hubert Young who recently died.

OBITUARY

Mr. S. Bartle.—The death occurred suddenly on 1st August at the age of forty-six of Mr. Stephen Bartle, manager of the Sound and Time Department of Dictograph Telephones, Ltd.

WILLS

Mr. J. H. Gaskell, a director of the Fittings Maintenance Co., Ltd., who died on 19th February last, left £3,635 gross (£2,593 net).

Mr. C. F. Johnston, former managing director of Gillett & Johnston, Ltd., who died on 30th March last, left £24,212 gross (£20,162 net).

Mr. W. J. F. Freeland, retired electrical engineer, who died on 5th June last, left £14,451 gross (£14.344 net).

Mr. C. H. Thatcher, A.M.I.E.E., of Wood Green, N., who died on 18th March last left £6,895 gross (£6,846 net).

Electricity Compensation Regulations

PROVISION was made in the Electricity Act, 1947, for the payment of £5,000,000 by the British Electricity Authority to local authorities whose electricity undertakings were transferred under the Act, by way of compensation for severance. Regulations now made by the Minister of Fuel and Power, entitled the Electricity (Severance Compensation) Regulations, 1950 (S.I. 1950 No. 1278, H.M. Stationery Office, price 2d), prescribe the conditions for participation and the principles and methods for dividing the sum among the authorities concerned.

In fixing the amounts which the authorities are to receive chief weight is given to the number of consumers. In addition, the authorities are given allowances based on the number of kWh generated and sold (excluding bulk sales) and upon their revenue from working. These are equivalent to 12½ per cent of the total compensation for generation and sale and 12½ per cent for revenue from working. The maximum sum any authority may receive is limited to £1 for each consumer.

In determining the amounts payable the particulars to be used are those given in the "Return of Engineering and Financial Statistics relating to Authorized Undertakings in Great Britain for the Year 1946-47."

Severance compensation regulations have also been made in respect of gas undertakings.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Guards for Fires

YOUR notes on guards for electric fires in the *Electrical Review* of 28th July interested me greatly. Some months ago a three-year-old friend of my children was nearly burnt to death by her night dress catching fire by being in close proximity to an ordinary bar type unprotected heater. In view of this accident I immediately purchased a convector type heater, on which purchase tax is higher than on the ordinary unprotected dangerous type of heater. I did this because I thought my children would be completely safe. Imagine my surprise when my 15-month-old son posted a letter through the out-going louvres, and, therefore, nearly had his eyes and hair burnt by watching the resulting flames being forced out in the expected manner. Immediately after this he stuffed waxed crayons into the slot, which needless to say filled the room with a most unpleasant odour.

I have since fitted a course mesh grill beyond the existing louvres on my fire which has stopped any similar incidents occurring. It is of sufficient size mesh not to interrupt the flow of warm air.

Although I am an engineer with years of experience in design, I suggest that every fire that is manufactured should be "field tested" by letting a parent stand by while his child will immediately show up any weak points in design. I sincerely hope that the Interdepartmental Committee appointed by the Government will bear this point in mind.

D. R. PARSONS, A.M.I.E.E.

Newcastle upon Tyne.

International Exchange

IN the issue of your journal dated 14th July I once more advanced my view that contractors in different countries should exchange views on methods and procedure. Your journal is read with some avidity by an electrical contracting firm in Rotterdam, and they have written to me on this subject of exchange visits. They say:—

> ". . . In our former letter we omitted our opinion that in general we have the same difficulties in our country as you have in yours. Therefore we heartily welcome your proposal to exchange views between the contractors in different countries. It might help us to the solution of our mutual problems and might be to the benefit of our task in this country. We send you a copy of an article published in the American magazine *Electrical Construction and Maintenance* of March, 1950, over the situation of our trade in the U.S.A. This article struck us as the situation in the States is very much similar to ours."

I had hoped that the Electrical Contractors' Association would have considered, and possibly acted upon this idea before now, and I would appeal to them once again to do so.

In the absence of such action, if those contractors in this country who feel that they would like to participate in exchange visits to other countries will write to me, I will do my best to start some useful activity in this direction with contractor friends in Italy, Switzerland, Holland and Sweden.

J. MORTIMER HAWKINS,
Managing Director,
Mortimer, Gall & Co., Ltd.

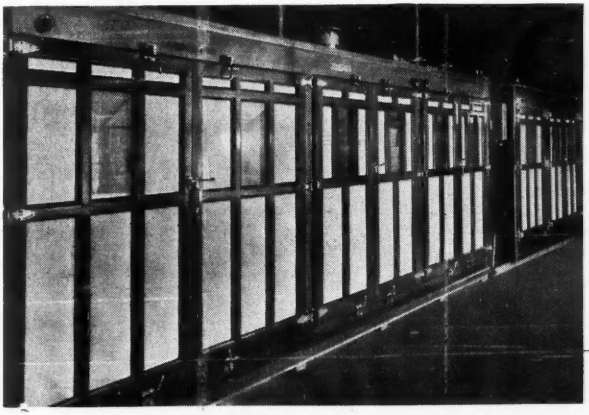
London, E.C.4.

Aluminium Alloy Castings

INFORMATION Bulletin, No. 17: "Aluminium Alloy Castings," published by the Aluminium Development Association, is chiefly addressed to manufacturers who receive castings from the foundry for incorporation in their own products. It should help the user to gain the fullest advantage from the properties of aluminium alloys and it strongly advises collaboration between user and foundryman.

Poultry Farming—2

Up-to-date Methods Using Electrical Aids for Incubation and Rearing

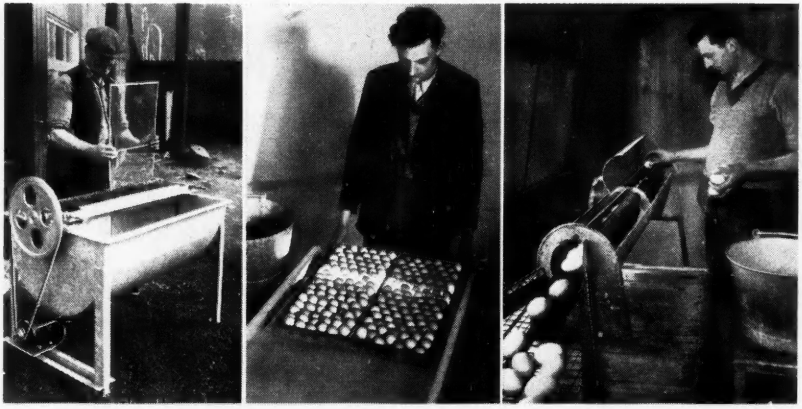


Bank of the latest type of Stephens incubators at Mr. J. Bee's farm, Sunny Bank, Hambleton

CONTINUING our investigations into applications of electricity on up-to-date poultry farms in Lancashire (the first part of this article appeared in the *Electrical Review* of 4th August), we next visited another large hatchery, where about 6,500 chicks a week are produced, that of Mr. J. Bee at Sunny Bank, Hambleton, near Poulton-le-Fylde. Here we had an opportunity of seeing one of the latest types of Stephens 20,000-egg incubators. As is the case in many other modern incubators, it has a completely separate hatching section to which the eggs, after testing for fertility, are transferred on the eighteenth day. Apart from the question of hygiene this arrangement reduces labour by confining major cleaning operations to the hatching department. The new apparatus also incorporates automatic turning gear which changes the position of the trays of eggs every hour. Improved air circulation also provides a more uniform temperature, which is very critical and has to be maintained at 99.5-100 deg F. In a smaller 12,000-egg apparatus the hatching section forms part of the main compartment. The incubator room is warmed and ventilated by four G.E.C. 2½ kW fan heaters and has fluorescent lighting.

For rearing chicks in brooders Mr. Bee does not approve of either tungsten or the recently introduced infra-red lamps for heating, but prefers wire-wound elements. He claims that the light attracts the chicks underneath the hovers when they should be outside and also that it spoils their rest. In fact, he goes a stage further and arranges his brooders

Tier of brooders at Mr. J. E. Hartley's farm



Left: Electrically operated equipment for cleaning brooder trays, etc., at Mr. H. Sutton's farm. Centre: Candling device used at Mr. R. Bowling's farm for testing a dozen eggs simultaneously. Right: An egg washer is also among the comprehensive equipment at Mr. Bowling's farm

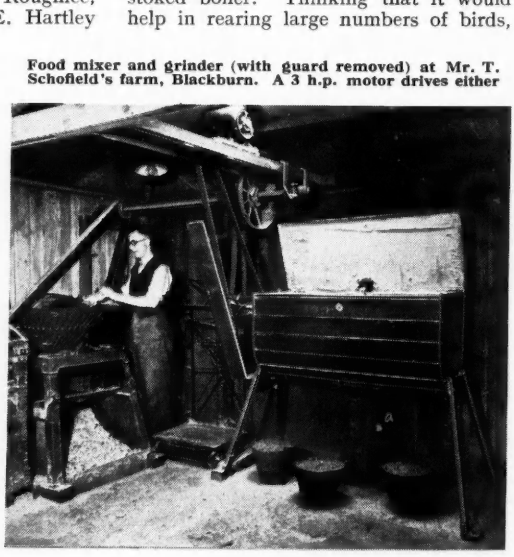
with their backs to the windows. Before doing this the chicks would not go into the heated compartments. A further electrical aid which he finds of great value is a machine incorporating brushes for cleaning the droppings trays.

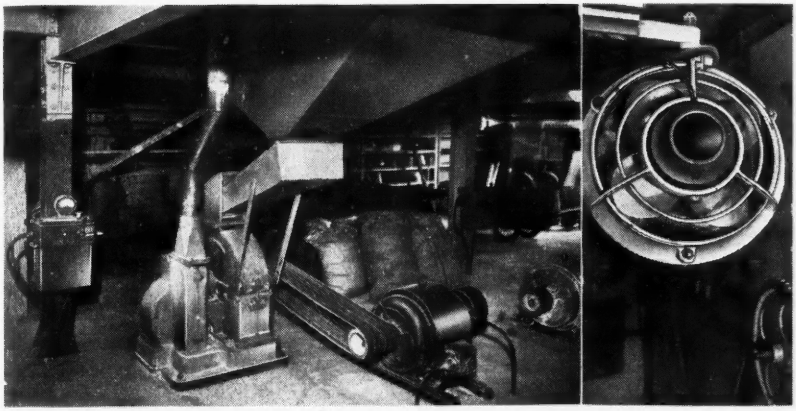
Interesting figures of electrical consumption are available for the installation at Sunnyside Poultry Farm, Roughlee, near Nelson, where Mr. J. E. Hartley specializes in commercial hatching and rearing. An average of 150,000 eggs is hatched annually with the aid of three cabinets (Stephens, Secura, and Bonnet) with a total egg capacity of 55,000. Again emphasizing the importance of cleanliness, Mr. Hartley carries out routine fumigation with formalin and permanganate of potash in the first twenty-four hours.

About 10,000 chicks are hatched out every week and, to meet the demand for four- and eight-week-old birds, brooders of 7,000-chick capacity are provided, accommodating 4,500 chicks of up to three weeks old and 2,500 chicks of more than that age. The average brooding is 1,000 a week for six months, the average age before disposal being five weeks. A Burco wash-boiler is in constant use as a humidifier.

In addition to the electric heating of the incubators and brooders, the whole building accommodating them is warmed by hot-water pipes from a mechanically stoked boiler. Thinking that it would help in rearing large numbers of birds,

Food mixer and grinder (with guard removed) at Mr. T. Schofield's farm, Blackburn. A 3 h.p. motor drives either



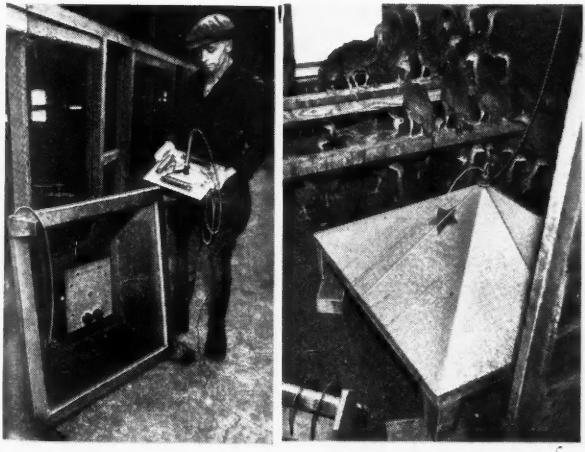


Left: Grinding machine at Mr. W. Bradley's farm, Fulwood. Right: Fan heaters are found to be very effective for warming the incubator house at Mr. R. Bowling's farm at Whitehill

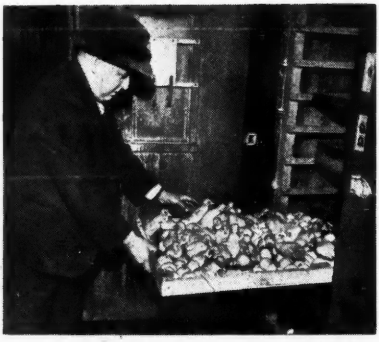
Mr. Hartley had a poultry house constructed on somewhat similar lines to those of Mr. Sutton with a heated floor. Although he does not condemn the system, he does not find it so suitable or convenient in his particular case. Adequate control is lacking, and to overcome this he would have to divide up the floor into a number of small compartments.

All the outdoor cabinets are wired for power and lighting, and cleaning of all apparatus and buildings is carried out with the aid of an industrial suction cleaner. Domestic appliances used include a cooker, refrigerator, washing machine, immersion heater and vacuum cleaner. For all these services 82,789 kWh was consumed last year, 54,472 kWh for heating power and domestic purposes, 27,581 kWh for off-peak heating (11 p.m. to 7 a.m.) and 736 kWh for lighting.

Electrically heated hover for turkeys at Mr. W. Bradley's farm at Lightfoot Green, Fulwood, Preston (left) raised to show element



An especially comprehensive collection of electrically operated poultry-farming equipment is to be seen on another farm engaged solely in breeding and selling chicks. At Mr. R. Bowling's Farm at Whitehill, Whittle-le-Wood, near Chorley, the installation comprises two 12,000-egg and one 6,000-egg Stephens incubators, a "home-made" candling device enabling a dozen eggs to be tested simultaneously, fan heaters, a 5 cwt "Adelphi" mixer, "Visi-Chick"



Ducklings hatching out in a 24,000-egg incubator on Mr. W. Bradley's farm

and carbon-lamp brooders, fattening batteries fitted with tubular heaters, machines for washing incubator trays, and egg-washing apparatus. We were told that the use of the mixer saved three shillings on every cwt of mash dealt with.

Other money-saving devices are to be seen on Mr. Schofield's Farm, referred to already. Here a 3 h.p. motor can be used alternatively for driving either an "Eclipse" grinder for dealing with stale bread, or an "Adelphi" mixer. It takes only four and a half minutes to mix two cwt of food, and seven of these mixes can be carried out for one penny. A 3 kW boiler successfully processes 2 cwt of potatoes in 2½ hours. The domestic quarters are all-electric and well equipped, all the hot water being supplied by a 20 gall U.D.B. heater.

To replace the hens in his batteries Mr. Schofield buys day-old chicks and rears them successively in "Day-O" battery brooders with 200 W wire-wound elements each (for fifteen days) and then in hovers each fitted with two 65 W "Stuwa" board-type elements. Only in the bottom brooders in the five tiers is the full loading of 200 W used, the rising heat from these rendering the reduced loading of 90 W or 110 W (available by three-heat switching) sufficient for the upper units. The total electricity consumption for both farm and house is just over 19,000 kWh a year.

The extensive use of electricity in Lancashire is not confined solely to chickens. On one of the largest duck and turkey farms in the country, Mr. W. Bradley, of Lightfoot Green Farm, Fulwood, Preston, has electrical equipment comprising a 24,000-egg incubator. Two hundred 200 W pyramid-type brooders, incorporating heaters of Mr. Bradley's own design utilizing wash-boiler-type elements; a refrigerator of sufficient capacity to hold 3,000 dressed ducks; hoists and blowers; grinders, mixers (two half-ton and two 5 cwt), hay chopper, and pulpers for turnips, etc.; a potato elevator; a mechanical stoker and pumps for the hot-water system used for heating the poultry cabins; saws, drills, paint sprayers and other workshop apparatus. The normal stock on the farm is about 40,000 ducks, but owing to the shortage of feeding materials the present figure is only about 10,000. In addition, there are about 5,000 turkeys of various ages and 500 hens. Besides supplying table birds, the farm produces eggs for hatching.

Mr. Bradley attributes his consistently good results to paying special attention to providing his birds with comfortable, warm conditions. The disturbance at night caused by lights of cars passing the farm has been overcome by fitting bulkhead units to the cabins. To supply these and other electrical apparatus around the 200-acre farm a private overhead-line system has been provided.

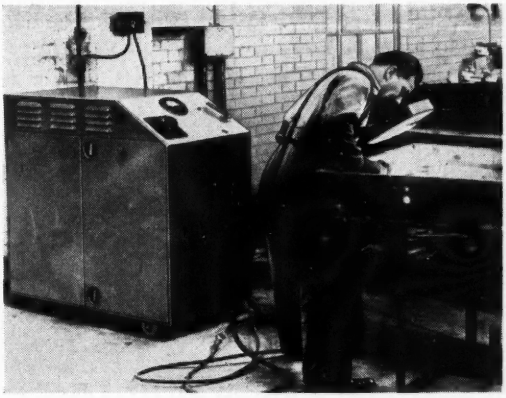
We are grateful to all the farmers concerned for permitting us to visit their farms and for giving us their views, and we thank, too, the members of the staff of the North Western Electricity Board who assisted us to prepare this article.

Batti-Wallahs' Society

CAPTAIN J. S. COWIE, C.B.E., R.N., who was in charge of under-water weapons at the Admiralty during the war, was the chief guest at the luncheon of the Batti-Wallahs' Society on 26th July. In a talk on "Minelaying in Enemy Waters," he spoke of some of the ingenious types of non-contact type mines which were devised, pointing out that the chaos created far outweighed the intrinsic value of the vessels destroyed. He paid tribute to the valuable co-operation of the electrical engineering industry. Mr. H. Nimmo (president) was in the chair and among others present were Commander J. G. D. Ouvry, D.S.O., R.N., Sir Stanley Angwin, Major-Gen. L. B. Nicholls, and Mr. R. R. B. Brown (Southern Electricity Board).

New D.C. Arc Welder

Stepless Electronic Regulation



Single-operator cubicle for d.c. arc welding

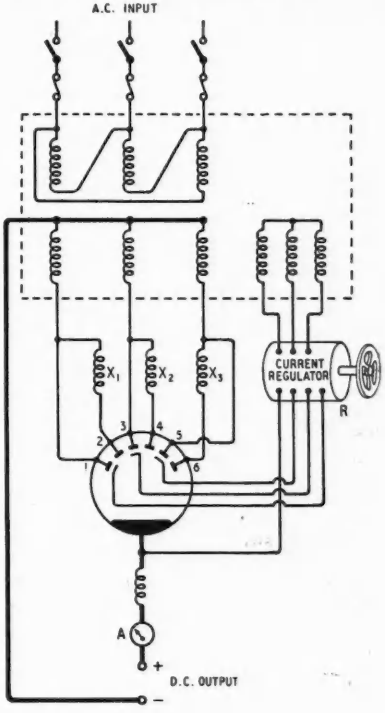
REDUCTION of maintenance by avoiding the use of rotating machines, regulating switches and oil-filled enclosures is a feature of the d.c. arc-welder introduced by the Hackbridge and Hewittic Electric Co., Ltd. Output current is varied on electronic principles.

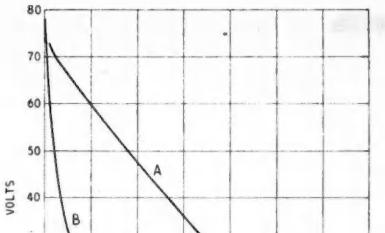
A six-arm mercury arc glass bulb rectifier of the grid control type is so connected that three of the anodes (1, 3, 5) are energized directly from the secondary of an air-cooled transformer, and the other three (2, 4, 6) through additional reactances X_1, X_2, X_3. Only the grids associated with the former three anodes are utilized for grid control; they are connected to a simple phase-shifting device R. Turning the handwheel of this device retards the instant of "firing" of anodes 1, 3 and 5 in each cycle of applied anode voltage, so smoothly reducing the average current carried by them, while arms 2, 4, 6 will carry progressively more of the total rectifier output and conversely as the "firing" is advanced.

For normal welding a typical range of adjustment is shown by the operating line OP from 20 A at 19 V to 80 A at 25 V, between which limits any setting is instantly available by one-hand control of the single wheel. The open circuit voltage of the rectifier is approximately 80 V, while the curves have a slope suited to arc welding and cut the normal operating line OP at a wide angle, indicating that the incremental regulation remains high at any operating point, so ensuring stability of arc.

Neither pole of the d.c. output is connected to earth; hence the polarity of the electrode negative to the work may be made either positive or negative by a change-over link at the rectifier. This facility increases versatility for general welding service. The rectifier has no mechanical or

Diagram of basic rectifier grid control circuit





Transformer characteristic curves: A with inherent reactance, and B with additional external reactors. OP = operating line

magnetic inertia, so that current and voltage follow instantly any change in arc length, from short circuit to broken arc, a feature which can be sensed in a closer control and greater uniformity of work.

This single-operator equipment can be supplied for stationary installation or as a mobile unit with wheeled chassis and draw bar, for any 3-phase a.c. 50 c/s mains input, the adjustment to match the input voltage being effected by a link inside the cubicle.

Consulting Engineers

THE annual report of the Association of Consulting Engineers for the year 1949-50, under the chairmanship of Mr. T. A. L. Paton, records an increase of membership by 35 to a total of 303 and an improvement of income. The long-drawn-out revision of the "Conditions of Contract" for civil engineering work ended with the issue in February of the second edition, for which there has since been a heavy demand. Some contractors insist upon the use of the "Conditions of Contract" issued jointly by the I.E.E. and I.Mech.E. instead of those of the A.C.E. for works of an electrical and mechanical nature. Amendment of the former would enable them to be used by the Association, so the I.E.E. has been approached on the subject.

Negotiations with Governement Departments respecting professional fees have not yet been settled. During the year 113 nominations were made in response to 90 requests for the services of consulting engineers from Government Departments, local authorities and commercial firms. Reiterated requests of the Board of Trade and the Ministry of Supply caused the Association to send a representative to Canada to ascertain what opportunities exist there for the co-operation of British with Canadian consultants. The cost of the inquiry is to be repaid by a levy on the fees received by A.C.E. members to whom work in Canada may be assigned. The arrangement is expected to enable more British materials to be used in Canada and more raw materials to be brought into the U.K. from the Dominion.

Insulating Oils

AS far as the electrical engineer is concerned, information on insulating oils is not easily available, being widely scattered throughout technical pournals and books little read by engineers. To provide the electrical engineer with a convenient means of obtaining a comprehensive understanding of the subject, the Shell Petroleum Co., Ltd., has issued an excellently produced 102-page book on insulating oils for transformers and switchgear.

Commencing with a discussion on the functions and selection of a dielectric medium, the book deals with the operating conditions of both transformers and switchgear oil, and the design of the apparatus itself in relation to the oil. Insulating oils for use in the ancillary equipment of transformers and switchgears also receive attention. The manufacture of insulating oil is then described and, after dealing with insulating oil specifications, there follows a section on the installation and operation of transformers and switchgear in relation to the oil. The concluding section of the book deals with sampling, testing and purification. There are also useful appendices.

Although it is not possible for a book of this kind to cover in detail every aspect of insulating oils, it presents concisely and in an accessible form the most relevant information required by those concerned with insulating oils.

South African Project

PLANS have been completed by the South African Electricity Supply Commission for building a large power station near Coalbrook, O.F.S. It is to be known as the Taaibos station and will cost some £20 million. Orders have so far been placed for four 60,000 kW generators (seven are proposed) and four 580,000 lb/hr boilers. The output of the station will be required mainly to meet the expected load development on the Reef.

Commerce and Industry

Turbo-alternator Control Ended

Richard Crittall Case

AN Order has been made by the Minister of Supply revoking, as from 1st August, the Control of Turbo-Alternators (No. 1) Order, 1947 (S.R. & O. 1947 No. 2386). This Order provided that no turbo-alternator of more than 10,000 kW capacity could be made in sizes other than 30,000 kW or 60,000 kW, except by licence from the Minister. It also specified steam pressures and temperatures. The measure, according to Mr. G. R. Strauss at the time, aimed at securing a reduction of from six to nine months in the production time. The new Order is entitled the Control of Turbo-Alternators (No. 2) (Revocation) Order, 1950 (S.I. 1950 No. 1221, Stationery Office, 1d).

Holidays Agreement

Agreement has been reached by the National Joint Industrial Council for the Electrical Contracting Industry that if a paid statutory holiday occurs during the period in which an operative is taking his annual paid holiday in accordance with the agreement of 2nd June, 1943, he is entitled to an alternative paid holiday in substitution either immediately following the paid holiday or subsequently during the same calendar year.

Richard Crittall Prospectus Case

Judgment was given at the Old Bailey last week in the case relating to the issue of a prospectus by Richard Crittall & Co., Ltd., Arthur Edward Patrick Hinds, forty-four, former managing director of the company, was sentenced by Mr. Justice Humphreys to three years' imprisonment after being found guilty on all twelve counts of inducing people to subscribe for shares in the company by recklessly making misleading statements in a prospectus and of making misleading forecasts. No order for costs was made, the Judge saying that he understood that Hinds was a bankrupt and that it would mean taking money away from the creditors.

Joseph Leslie Musgrave, seventy-three, former chairman of the company, was found not guilty on three counts of making misleading statements in a prospectus, but guilty on three counts of making misleading forecasts. He was fined £1,000 and ordered to pay £500 towards the costs of the prosecution. He was given three months in which to pay, failing which he would be sent to prison for twelve months.

Kenneth Forbes Steven, forty-eight, chartered accountant, charged with Hinds and Musgrave with inducing people to subscribe for shares by recklessly making misleading statements in a prospectus, was found not guilty and discharged.

Contract Price Adjustment Formulae

The latest figures for use in the B.E.A.M.A. contract price adjustment formulae are as follows: "Rates of Pay": The rate of pay for adult male labour at 8th July is 115s (unchanged). "Costs of Material": The index figure for intermediate products published by the Board of Trade on 8th July is 285.2 and is the figure for the month of June (against 282.6 for May).

Rubber Situation

The Secretariat of the Rubber Study Group reports that the total production of natural rubber during the first half of this year was 822,500 long tons and the consumption 792,500 tons. Stocks at the end of the period totalled 715,000 tons, a decline of 10,000 tons since 1st January this year. Production of synthetic rubber amounted to 230,000 tons and consumption to 255,000 tons. The stocks at the end of June, 75,000 tons, were 35,000 tons less than at 1st January.

Diesel-Electric Locomotive Performance

One of the most powerful diesel-electric locomotives in Europe, the Sulzer 4,400 h.p. 225-ton machine of the French National Railways, has now completed over 1,000,000 km in express passenger service, hauling trains of 550 to 750 tons weight. The two original 1,420 kW main generators, six 580 h.p. spring-borne traction motors and Jeumont electrical control gear are still in operation and have needed only minor replacements. The two oil engines still retain 22 of the original 24 pistons, all the original cylinder heads, crankshafts,

fuel pumps and exhaust valves, and 90 per cent of the original inlet valves. Until the recent 1,500 V d.c. electrification between Laroche and Dijon, the locomotive made a 635-mile round trip each day between Paris and Lyons. Now it has been transferred south and makes a return trip between Lyons and Nice every 24 hours.

Pumping Station Improvements

A scheme has been prepared for improvements at the Brixton pumping station of the Metropolitan Water Board, including the installation of additional pumping plant. With the introduction of purchased electric power for the pumps it is also proposed to take the opportunity of changing all the lighting to standard a.c., with the exception of the emergency lamps in the engine house, and to install fluorescent lighting in the various offices. The total cost of the whole scheme, including wiring, provision of transformer, etc., is estimated at £24,250.

Rubber Research in Malaya

A research centre has been opened near Batang Malaka, Negri Sembilan, by Dunlop Malayan Estates to work in co-operation with the new research centre at Fort Dunlop (referred to in our issue of 16th June), and so adjust the supply of latex to the varied demands of industry. Natural latex is preferred to meet the growing world demand for foam rubber, and here the Centre will investigate the problems of the natural rubber industry to counter competition from synthetic products. Dr. F. J. Paton, who directs the work of research has been responsible for the last 16 years for Dunlop's major technical developments. His chief assistant is Mr. D. W. Pounder.

E.A.W. Branch

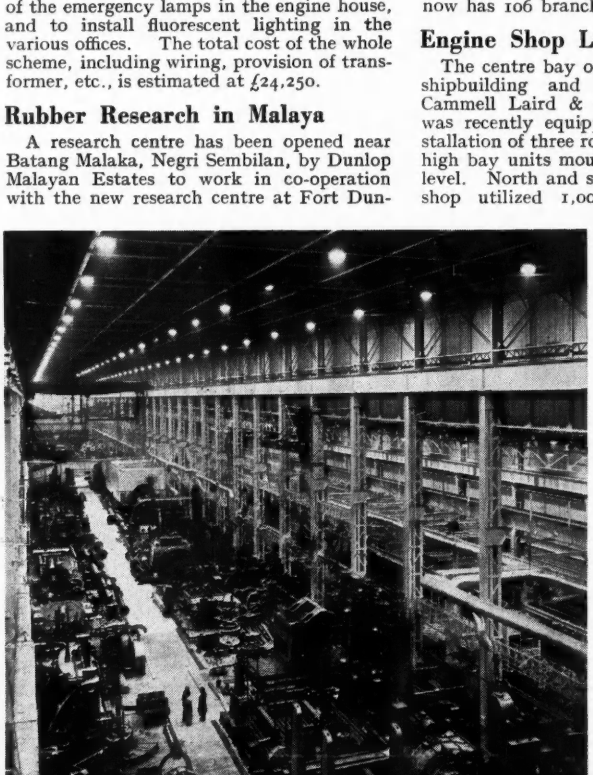
A Bridlington Branch of the Electrical Association for Women was recently formed when the Mayoress, who has now become the president, took the chair. The E.A.W. now has 106 branches.

Engine Shop Lighting

The centre bay of the engine shop in the shipbuilding and engineering works of Cammell Laird & Co., Ltd., Birkenhead, was recently equipped with a lighting installation of three rows of Benjamin 1,500 W high bay units mounted at 74ft above floor level. North and south bays in this engine shop utilized 1,000 W high bay units mounted at 49ft, the average illumination value overall being 10 ft-candles.

Each unit is fitted with a heavy-duty "Saaflux" top and with a clear glass visor cover, rendering it dust proof. The reflector is made of aluminium with "Brytal" finish, providing a semi-specular reflecting surface in order to direct the light in a concentrating type of distribution and at the same time avoiding striation. The outside is sprayed aluminium.

The engine shop is believed to be the largest of its kind in the shipbuilding industry, and the total load in the three bays amounts to 236 kW. Maintenance of the



Lighting of the engine shop at the Cammell Laird works

fittings is carried out from the overhead electric travelling cranes. The electrical installation was carried out by the Cammell Laird Works Electrical Department.

Lighting for Display

Display representatives of Bournemouth's leading retail stores attended a lecture and demonstration of window and display lighting given by Mr. T. S. Jones, chief lighting engineer of Crompton Parkinson, Ltd., at a meeting sponsored by the Southern Region Branch of the British Display Association, held at Bournemouth on 11th July. Mr. L. Tuckett, chairman of the Southern Region Branch, presided.

A selection of lighting equipment was on view and Mr. Jones referred to various items during the course of his lecture, especially in reference to the design of installations.

Annual Holidays

The Congleton Works of Micromatic, Ltd., will be closed from 12th to 21st August inclusive. The Bournemouth head office will operate as usual.

Henley Research Fellowship

The Governors of Queen Mary College have accepted an offer by W. T. Henley's Telegraph Works Co., Ltd., for the establishment of a Research Fellowship in Electrical Engineering at Queen Mary College. As the maximum remuneration of the W. T. Henley Fellowship, as it will be called, is £600 per annum, it will be possible to attract to the College senior research men who have already had some works experience. It is hoped that the investigations carried out by the W. T. Henley Fellows will be more particularly in the field of dielectrics, high-voltage engineering, and arc-interruption phenomena.

Institute of Physics Certificate

The Board of the Institute of Physics announces that the Institute's Certificate in Laboratory Arts will not be awarded after 1951 in view of the establishment of the Intermediate Certificate for laboratory technicians by the City and Guilds of London Institute.

Scientific Method in Industry

The Industrial Applications Section of the Royal Statistical Society is organizing a conference at Sheffield University on "Scientific Method in Industrial Production" where technicians and managements of manufacturing concerns will be able to meet statisticians interested in industrial problems. The conference lasts from Friday afternoon, 29th September, to the afternoon of Sunday, 1st October. The Friday papers particularly have been designed for non-statistical audiences. Applications for attendance at the conference, for which a fee of one guinea is charged, should be sent to the Assistant Secretary, Royal Statistical Society, 4, Portugal Street, London, W.C.2.

British Institute of Management

At the annual general meeting of the British Institute of Management on 26th July Sir Charles Renold, the chairman, stated that the Council had agreed that the time was ripe for the Institute to set about the development of professional qualifications in general management as the basis for building up a professional membership. Arrangements would, however, have to be made for senior managers whose practical achievements merited recognition, to be associated with the Institute in a professional capacity in separate "transitional" categories.

Industrial Year Book

A great deal of miscellaneous useful information is contained in *The Scope Year Book of Industry, Trade and Finance*, just published by Scope Books, Ltd., 1, New Bond Street, London, W.1, (645 pp, 45s). It contains up-to-date reviews of industry generally and of particular branches, commodity markets, banking and credit, insurance and national and international finance. There are sections on legal decisions affecting business, labour relations, etc., as well as a number of directory sections including lists of chief officials of national and semi-public bodies, professional and trade organizations, newspapers and periodicals, etc. A great deal of space is devoted to particulars of the countries of the world. In addition there is copious statistical matter covering various phases of national and world economy.

Welding Research

In the June issue of *Welding Research*, the journal of the British Welding Research Association, is an interesting report entitled "Recommendations for the Metal-Arc Welding of Butt Welds in Steel Pipelines for Power Plant." These recommendations cover the butt welding by the metal-arc process of steel pipe-lines of wall thickness from 8 s.w.g. and of outside diameters exceeding 2in. By the methods described, pipe-lines varying from these limits up to 13in outside diameter and wall thicknesses reaching 1.75in, have been successfully constructed for working pressures up to

2,000 lb/sq in and working temperatures of 540 deg C. The parent materials considered include mild and medium-carbon steels, molybdenum, chrome-molybdenum and molybdenum-vanadium alloy steels to certain defined specifications.

Loss Through Electricity Cut

In the Ulster High Court last week Lord Justice Black gave a reserved judgment in an appeal by the Electricity Board for Northern Ireland against an award of £75 18s made by the Acting County Court Judge of County Antrim to Mr. James Wylie Erskine. The claim for damages was on the grounds of the alleged negligence and carelessness of the Board in cutting off the electricity supply to Mr. Erskine's premises on 14th April, 1948, without sufficient notice, as a consequence of which he lost 862 day-old chicks while 150 others were so injured as to be made unsaleable. Lord Justice Black held that, on the authority of a case decided by the Court of Common Pleas many years ago, Mr. Erskine was not entitled to recover damages. His Lordship accordingly reversed the decree and dismissed plaintiff's case.

Public Transport Luncheon

The annual luncheon of the Public Transport Association will be held at the Connaught Rooms, Great Queen Street, W.C.2, on 28th September, during the period of the Commercial Motor Show. Mr. H. Spurrier, vice-president of the Society of Motor Manufacturers and Traders, will be the principal guest.

Cement Works Intercommunication Equipment

After studying loading control the Rugby Portland Cement Co., Ltd., concluded that time could be saved by the installation of an audible system of communication, which the British Thomson-Houston Co. has recently put in at the Southam works. There are two packing stations at the works, each feeding five loading points, two for road, two for rail and one for canal transport, the latter being some 400yd from the packing station. The intercommunication system enables the operators at either packing station to speak to the loading teams which they serve and *vice-versa*, as opposed to the use of signal lights, bells and telephones. There are seven points at which supervisory control is necessary. At each a speaker unit and control box incorporating a microphone have been in operation since June. To exclude cement particles, each unit is in a heavy-gauge sheet-steel case fitted with a spring-loaded dustproof door. All switches are totally enclosed and the horn speakers are of the re-entrant type. The complete equipment is built to a "tropical" specification.

Shire Hall Lighting

As part of a scheme for redecorating the Shire Hall, Worcester, Abell & Smith, Ltd., have installed in the Assembly Room three candelabra-type lighting units. The fittings, a special design for the hall by the G.E.C., are 21ft long and weigh 4½ cwt each. There are five 200 W filament lamps behind the screening and fifteen 80 W fluorescent tubes arranged in two circles. For repair, each fitting can be winched up through the roof.

Catalogues and Lists

Contactor Switchgear, Ltd., Moorfield Road, Wolverhampton.—Priced catalogue of automatic starting and control gear for machines of from 1 to 750 h.p.

Aluminium Wire and Cable Co., Ltd., Port Tennant, Swansea, Glamorgan.—Folder outlining the properties, advantages and applications of aluminium for overhead power transmission.

Battery Construction, Ltd., Bristol Road, Bridgwater, Somerset.—Priced catalogue of batteries for radio, automobiles, house lighting and traction purposes.

Millett, Levens (Engravers), Ltd., 47, Whadcoat St., Finsbury Park, London, N.4.—A folder illustrating nameplates of every description.

London Electrical Firm, Ltd., Brighton Road, South Croydon, Surrey.—Illustrated catalogue of raising and lowering gear for lighting equipment, hand winches and searchlights for industrial and marine purposes.

Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2.—Technical leaflet on the "Modulat" ovens with automatic temperature control over the range 25 deg C to 170 deg C.

Hackbridge & Hewittic Electric Co., Ltd., Walton-on-Thames, Surrey.—Technical brochure (No. R226) on mercury arc rectifiers for d.c. supply to electro-chemical processes.

Brush Electrical Engineering Co., Ltd., Loughborough.—Technical brochure on standardized switchgear for heavy industries.

W. Edwards & Co. (London), Ltd., Worsley Bridge Road, London, S.E.26.—Digest catalogue of high vacuum equipment for industrial, research and educational purposes.

ELECTRICAL CONTRACTING:
Organization and Routine

By H. R. TAUNTON, A.M.I.E.E.

11—Orders

AFTER so much spade-work, we may now expect some of its fruits: orders. Every morning's post may bring them, big and little—it is to be hoped so, at least—and a systematic routine of booking and dealing with them is obviously necessary to avoid delays and oversights.

Orders arriving by post may be classified as: (*a*) Acceptances of tenders for complete installations, usually dignified as "contracts." (*b*) Acceptances of smaller estimates for extensions or repairs, given the more homely name of "jobs." (*c*) Instructions for variations to work in progress, or orders for supplies in connection with it. (*d*) Acceptances of quotations for supplies, or orders involving no labour, including cash sales. Each of these requires different treatment in its later stages; but the earlier routine should be the same for all.

Acknowledgment of Orders

All orders should be acknowledged promptly and gratefully: after all, where should we be without them? Acknowledgment is obvious enough in the case of the larger ones, but the smallest deserves a similar courtesy. The only possible exception is that of orders for standard supplies which can be dealt with by return of post. The delivery of the goods with their attached advice note may be considered sufficient acknowledgment.

Orders which arrive by post are usually in writing, completing a legal bargain of which the accepted estimate forms the antecedent part. If, however, they are open orders, acknowledgment and confirmation by the contractor is necessary to complete the bargain. Acknowledgment and confirmation become still more important when an order is verbal or telephonic, as many small ones are.

The order is often accompanied by a request that the work shall be put in hand at once. To comply with it literally is to take a risk, particularly with a new customer. The sound procedure is to write him, thank him for his order and confirm it by a reference to an accepted estimate; or if there is none, to give one, at least approximately, asking for an acknowledgment.

Verbal Instructions

In a somewhat different way, the point is continually cropping up in connection with charges for variations on contract work. Instructions for them are, as often as not, given by word of mouth by the customer or his architect, and commonly to the foreman; and if he fails to report it promptly and accurately, the firm may be involved in serious loss. For, so long as the order is merely verbal, it is valueless in law. The mere fact that, for instance, an extra pendant has visibly been wired for and fixed in a certain position, is no proof that it is by the customer's knowledge or instructions and he may choose to dispute it—perhaps in good faith.

All such verbal orders should be committed at once to writing. It is the simplest insurance against a vexatious dispute, which, even if its upshot is not an actual loss of money, may result in the loss of a disgruntled customer.

No firm with any pretensions to business acumen will blindly accept every order it receives. The normal risk of not making a profit on a job is bad enough, but it is implicit in the very character of contracting. The risk of losing not only the profit but the cost of a job which will never be paid for, has not that excuse. It is generally avoidable by foresight and reasonable precautions. It will be easy enough in the case of public bodies and commercial concerns

of known repute. The contractor need not look askance, for instance, at a £5 order coming from a Government Department or from a bank, one of the "Big Five." But in the year of grace in which this is being written there are not many such exemplars of stability; and it is the small customer who in the nature of things is most likely to be the shaky one.

It is not enough, however, to be assured that the nominal customer is able to pay. He may be a millionaire; but he may be under no legal liability to pay, if he did not actually sign the order himself. If the order is given on his behalf by a consultant or architect, a secretary or other agent of his, that is enough. But a wife cannot pledge her husband's credit for such a legal "unnecessary" as an electric lighting installation, nor a minor his father's for a radio set. For every order, then, there are two questions to be asked before it can safely be accepted: Who is going to pay for it, and can he—or will he—pay for it? No costs should be incurred on it before both are satisfactorily answered.

Method of Recording

A desirable check on incoming orders is a book in which all are recorded *seriatim* as soon as they come to hand—the "Orders In" book. It is not a necessity to the organization, but apart from its value as a check, it can be made so useful in other ways that it is well worth the little trouble required to keep it. Each day's orders should be on a separate page with a detachable counterfoil. Every morning, and during the day, as soon as letters are opened and before they are distributed, any orders contained in them or implied in them—not only formal orders, but variations which involve extras—should be entered one by one, with a note of their value, if that is known.

In keeping properly a record of this kind, the question arises, who is to do the work? The answer is, everybody on the staff, from the principal downwards, into whose hands an order first comes. Still, what is everybody's business is nobody's and some safeguard is needed against omissions which would spoil the completeness of the record. One member of the staff, therefore—not too junior—should be made responsible for it. His task will be to see that, in this respect, everybody else does his job. He will check the day's entries with the day-sheets and advice notes issued, correct any errors and fill in any prices which have been omitted temporarily—approximately if definite figures are not available.

If there is a shop or showroom, the day's record should be completed by a note of the total of the cash sales and of any credit sales or unfilled orders. The counterfoil can then be torn out and placed on the manager's desk as his morning's tonic—or otherwise—and he, in due course, will pass it to the accountant.

The conveniences of this "Orders In" record are many and obvious. The check on the completeness of the day-sheets and the advice notes is implicit in the procedure described. The counterfoils are of material assistance to the accountant in drafting his accounts, a reminder of every item which has to be included in them. Moreover, it can be a valuable mine of information, answering all sorts of interesting questions. How many lamps did we sell last month? Are we doing the trade we should in accessories? When was that fan ordered by Smith? How long is it since we had anything from Brown? These could all be answered otherwise, but only by reference, sometimes complicated, to scattered files and papers.

Showing the Trend

The one important question it can answer better than could anything else is the general trend of the business. It gives the total of orders secured on each day, and the figures can be added up to give weekly or monthly totals. From the results an interesting graph can be constructed, which will give the desired information at a glance. Let the vertical ordinates represent pounds, starting from any convenient datum, such as the round figure of the minimum monthly turnover necessary to cover standing charges. Another line should be drawn to represent the normal monthly turnover to be aimed at, based either on preceding years' results, or on optimism. The horizontal ordinates will be the twelve months of the year.

At the end of January, the total of

orders booked will give the first point on the chart. At the end of any other month the total divided by the number of months elapsed will give another point. Joining the points, we have our graph. It may be erratic during the first few months, but it will steady down as the year goes on and the law of averages asserts itself. If, the following year, the same chart is used, the new curve being plotted in different-coloured ink, a further comparison, of the current volume of orders with that of the preceding year at the same date, will be available.

The principal will probably prefer to plot it himself and keep it locked away; but there is no reason why he should not hang it on the wall, a graphic "Excelsior!" Without an inscription, and with the datum known only to himself, it will give away no secrets.

Large Installations

So far the procedure is common to all incoming orders; but now each class of order will require different treatment. Consider first the largest, for complete installations. An acceptance by the architect or consultant will often be the only written order the contractor will receive for the work; but it may be followed by a confirmation from the client, and if the installation is for a new building, by a formal order from the general contractor. All such supplementary orders should be treated as one with the original and eventually filed together.

The general contractor's order should be carefully compared with the original, and exception promptly taken to any variation from it—probably in the terms of payment. The original tender may have expressly excluded any cash discount, but the builder will artlessly—perhaps from force of habit—quote the accepted price, "less 2½ per cent for cash, etc." Nor is that all. A little later he will send the contractor a form of sub-contract to sign: a normal procedure, although sometimes omitted. This will usually be on the standard form issued by the Institute of Builders, but it should be read carefully. Apart from the disputed "cash discount" clause, it may have a "variation" clause defining percentages on day-work costs, impossibly unremunerative to an electrical contractor. Quite commonly it will contain a reference to the "general contract," the terms of which the sub-contractor is asked to accept on the assumption that he has read them; whereas, in practice, that document usually remains a sealed mystery to him. The terms of payment may be unfavourable; and it is not uncommon for a penalty to be noted—though perhaps none was originally specified—out of all proportion to the value of the sub-contract.

If there is anything to which he can reasonably take exception, the electrical contractor should not hesitate to do so. He has his order for the work, and no threat by the builder to withdraw it need dismay him. And be it said in fairness, most builders are reasonable, and any such little differences of opinion are generally settled easily enough. The contractor should see that he has a duplicate of the form of sub-contract and, legally, it should be stamped.

The treatment of orders for jobs (*b*) will be the same, except that, the amount involved being small, there will be no formalities in the way of sub-contracts.

Variations to Contracts

Orders for variations to contracts or jobs may be either for supplies—lamps, for instance—involving no labour, or for extra work or alterations. They may follow an estimate, be covered by schedule rates, or be open. They may originate with the customer, instructions perhaps for some small alteration, given without appreciation of the fact that they entail an extra charge. All these must be put on a common basis of definiteness; by acknowledgment, confirmation, and, wherever possible, by quotation. A variation cannot be considered as an order until it is agreed as such by the customer. Even if the item is agreed in principle, dispute may still be possible if the cost of it has been left undefined.

On certain contracts, particularly work in new buildings, extras may more than double the amount of the original tender. There are firms—and not small firms—who deliberately gamble on extras. Where they judge that a contract is sure to be "cut up"—widely varied and extended—they will knowingly put in a low tender which bears no relation to the estimated cost. The practice is unsound

and reprehensible. For the reasoned calculation of overheads and profit it substitutes blind chance, and reduces scientific estimating to a farce. The trade—the saner element in it—suffers; and the public suffers. It may think it is getting a bargain in a low first tender, but it has to pay through the nose for variations, for which the contractor must overcharge to recoup himself for his loss on the main contract. That again reacts on the trade, which as a body gets the reputation of profiteering on extras. The steady contractor finds his reasonable bill criticized at every point and his fair percentage of profit whittled away.

It is improbable that the gambling firms will be touched by this melancholy picture. So long as their gamble pays them—and it must be confessed it often does—they will repeat it. There is no means of checking the practice; and the only end to it for the individual adventurer is the inevitable cropper. All that the responsible trader can do is to put all his orders for variations on the firmest possible basis. There can be no dispute about an accepted quotation.

Strict Cost Basis

There is a great temptation on receiving an order for an unpriced variation to leave it open till the account is made up. Disinclination to commit oneself to a limited profit, procrastination on the chance that the item can be charged up at day-work rates or as a lump sum after the actual cost of it is known, has the allurement of safety and of opportunity to make up on the swings what may have been lost on the roundabouts. It is a false allurement. Consultants and architects are apt to demand the production of invoices and time-sheets. Charges for extras at day-work rates must therefore be based strictly on cost, from necessity if not from ordinary honesty, and lump sums must bear a defensible proportion to it. The chances of making up losses on estimates by big profits on extras are therefore limited, and, at the best, risky.

This policy of estimating for variations whenever possible has been stressed at length because so many contractors cannot be induced to see its advantages: reduced labour in preparing accounts; the assurance that they will be paid in full instead of being subject to allowances to meet criticism; and, most important of all, the avoidance of friction.

Day-sheets—or, as some call them, "Job Orders"—should be made out for all variations as soon as instructions are given for them, whether they are covered by estimates or are to be carried out as day-work. The foreman must have his sheet as authority to carry on, and so that he may enter the labour and material spent on it, without waiting for the result of any discussion with the customer as to whether a charge can be made for it. If in the upshot it cannot, the day-sheet can simply be cancelled.

Orders for Supplies

Orders for variations involving no labour—that is to say, for supplies such as fittings, lamps, etc.—should be dealt with, not by day-sheets but by advice notes, in the same way as ordinary orders for supplies, discussed hereunder. They should bear a reference to the day-sheet number covering the main contract or job, to ensure that the invoices against them are booked to the appropriate account in the cost ledger.

Orders for supplies not connected with any current job might be dealt with like any other order by the issue of a day-sheet; and this should certainly be done whenever the least amount of labour is involved—if a customer orders a fan, for instance, and a man has to be sent to fit it and connect it up.

The better method of booking orders for supplies (without labour) is simply to write out the advice note for them which will be used when the goods are delivered, thus also providing the necessary record. The delivery date space should for the moment be left blank, the date of the order being noted as it would be on a day-sheet.

To avoid confusion with ordinary advice notes, a separate book should be reserved for these (including those similarly dealing with supplies connected with a contract). The accountant would then know that every counterfoil in that particular book was a chargeable item, either as an extra to a contract or job as indicated by a day-sheet number, or individually under "Miscellaneous Sales." Similar orders received verbally in the showroom or shop, for supplies not in stock, can be dealt with in the same way.

Supply in Southern Rhodesia

Steady Growth of Commission's Undertaking

By DOUGLAS SPENCER

THE gold mines of Southern Rhodesia have placed the country in a very favourable position for the construction of transmission lines over a wide area. There is in nearly all the electrified districts a gold mine, or some other mine such as chrome, asbestos or mica, to provide a good basic load. It is not often that so young a country, and one so sparsely inhabited—120,000 whites and 1,600,000 natives in an area the size of England and Wales—has the advantage of so widespread a system. By March, 1949, the total length of lines was 2,981 route miles.

The adoption of electricity on an ever-increasing number of farms and for dwellers in rural areas has, in fact, been rendered possible only by the existence of the mines, which are fortunately found almost entirely in those stretches of the country in which the best agricultural soil is found, so that miners and farmers benefit each other in the matter of markets for power.

During the year ended March, 1949, sales of electricity increased by 20 per cent as shown in the following table:—

Class	Million kWh	
	1947-48	1948-49
Mines	107.0	123.4
Municipalities	18.0	25.5
Rural	2.4	3.5
Domestic and lighting ...	3.0	3.9
Industrial	13.4	16.5
Total	143.8	172.8

It will be seen that rural supplies, together with domestic and lighting, amounted to 7.4 million kWh in 1948-49, an increase of 37 per cent over the previous year.

The increase in rural supplies is reflected in the range of electrical equipment to be found on farms (which are generally of 1,500 to 3,000 acres or more) such as a 25 h.p. motor for milling, 7 to 10 h.p. for threshing, several units of 2-3 h.p. for pumping, electric refrigerators, cooking stoves, sweepers, kettles, coffee percolators, toasters, fans, radio sets and in some cases an electric welder for farm repairs.

Mention is made of these articles because of the rather vague idea of the degree of civilization and domestic comfort prevailing in the rural districts of the country, and a very wide market can be missed through lack of information. Moreover, foreign competition is becoming stronger every week. As a measure of the future prospects it is worth noting that in 1948 the European population of the country increased by 17,000.

Commission's Finances

Figures indicating the growth of the undertaking are: Plant in operation, 51,220 kW; plant on order, 63,750 kW; and total capital expenditure, £4,520,606. Revenue in 1948-49 amounted to £634,215, and expenses, including capital charges, were £672,227. There was thus a loss (including interest on loans at 3½ per cent and on Treasury advances) of £38,012. This brings the total deficiency from the inception of the Commission's operations in 1936 to £101,618. Considering the difficulties in obtaining plant during and after the war and the natural delay in building up a new venture this result can be regarded as satisfactory.

It is only during the last three years that losses have been incurred. Capital charges on new plant which had not been brought into full operation were largely responsible for this. Of the total costs of £672,227 in 1948-49, capital charges accounted for 39 per cent, generating costs 27.5 per cent, electricity purchased 10.3 per cent, distribution 8.8 per cent, head office administration and engineering expenses 7.7 per cent, and general

expenses and local administration 6.7 per cent. Past losses should be recovered without great hardship to consumers even allowing for the increased price of coal. The tariffs are not found to be too high considering the saving in labour which results. For the ordinary rural or farm user the charge is 7d per kWh for the first 120 kWh a month, 3d for the next 120, 1d for the next 480, and ½d per kWh thereafter. This tariff allows for two miles of l.v. line from the transformer on the h.v. line; above two miles there is a charge of 12s 6d per month for every quarter mile. For users of large quantities of electricity special tariffs are offered.

Hopes are entertained that the coal deposits in the Sebungwe area, some seventy miles from the iron and steel works at Que Que, and about the same distance from the main station at Umniati, may be developed, thus reducing rail charges for fuel, which account for 10.3 per cent of the operation costs.

In any case, Southern Rhodesia can be very happy that it has such a sound electricity supply scheme financed out of Government loans which are in course of redemption.

S. Rhodesian Electrical Market

IF all that is expected from Southern Rhodesia's far-reaching plans for power production comes to pass a good market for electrical apparatus should long be assured. About 600,000 kW of plant is to be installed at Kariba Gorge and eventually generating groups with a peak capacity of one million kW will be linked with transmission lines of 175 to 250 miles.

Such is the future outlook. With regard to the more immediate prospect, the latest monthly review of the Standard Bank of South Africa says that trade is expected to become increasingly active in the coming months as further progress is made with the marketing of the tobacco and other summer crops. Meanwhile turnovers continue to be satisfactory, and in staple lines have tended to expand with the continued increase in immigration.

The great increase in industrial output between 1938 and 1948 (from £8,159,000 to £37,852,000 in gross value) has directly stimulated commercial activity and raised the purchasing power of the native population considerably.

Details of Southern Rhodesia's import trade in electrical machinery and apparatus in 1949 have just reached London by air mail. They show that compared with 1948 imports of machinery approximately doubled, while those of cable and wire rose about 50 per cent, and many other items increased also. South Africa's gradual progress in this market is noteworthy.

Class of Equipment	1949 £ (000)	Inc. or dec. on 1948 £ (000)
Batteries	148	+ 22
From United Kingdom	69	+ 7
„ South Africa	69	+ 11
Motors and parts	203	+ 52
From United Kingdom	181	+ 61
„ South Africa	6	− 12
„ Sweden	4	− 1
„ United States	8	+ 2
Transformers	409	+270
From United Kingdom	388	+264
„ South Africa	14	+ 2
„ United States	6	+ 4
Other elec. machinery	536	+315
From United Kingdom	482	+312
„ South Africa	30	+ 8
„ United States	23	+ 2
Elec. cable and wire	928	+301
From United Kingdom	639	+183
„ South Africa	255	+118
„ United States	33	+ 6
Lamp bulbs	71	− 9
From United Kingdom	34	− 13
„ South Africa	18	− 1
„ Holland	12	+ 6
„ United States	7	− 1

Class of Equipment	1949 £ (000)	Inc. or dec. on 1948 £ (000)
Telegraph and telephone material and implements	394	+139
From United Kingdom	385	+137
„ United States	5	+ 1
Radio material	218	− 6
From United Kingdom	115	− 15
„ South Africa	70	+ 29
„ Holland	8	+ 1
„ United States	23	− 15
Elec. stoves, ranges and parts.	121	− 13
From United Kingdom	101	+ 15
„ Canada	5	− 18
„ South Africa	12	+ 4
„ United States	1	− 4
Other elec. heating and cooking apparatus	198	+ 63
From United Kingdom	166	+ 73
„ South Africa	28	− 3
„ United States	1	− 7
Other elec. goods and apparatus	554	+ 86
From United Kingdom	404	+ 75
„ Canada	1	− 1
„ South Africa	118	+ 55
„ United States	20	− 18

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

Dry Cell for Flashguns

A UNIT dry cell for use in photographic flashguns is now available from the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. It has been designed to have a sustained working life, and will give an initial short-circuit current of 10 A. This cell, known as the G.E.C. photoflash cell, catalogue number BA.6115, is priced at 7½d.

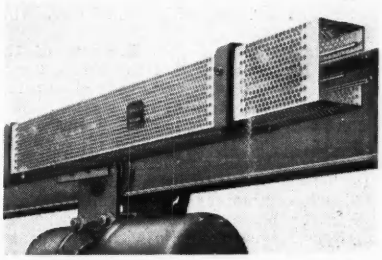
Bain-Marie Hotcupboard

Constructed on a similar framework to the company's unit-type fish-and-chip fryer, a 4-pot bain-marie hotcupboard introduced by the ARORA COMPANY, Rosebery Street, Loughborough, can be built into a composite equipment for café use or it can be fitted with castors. It measures 40in high (36in to hob), 24in wide by 27in deep and it has a welded steel frame, sheet steel panels and doors, and is fully lagged. The standard finish is sprayed aluminium enamel or white enamel with aluminium hob and black plinth. The hotcupboard, with interior dimensions of 19½in high by 20in wide by 22in deep, has a removable perforated sheet steel shelf. Each pan has a capacity of 8 pints.

Heating is provided by "Arora" armoured type elements mounted under the pans of the bain-marie and in the bottom of the hotcupboard, "Simmerstat" control being provided in each case. The loadings of the bain-marie and the hotcupboard are 1,750 W and 2,000 W respectively. Mains pilot light and fuses are provided.

Protected Conductor Track

The potential danger of electric shock occasioned by the use of unprotected conductor track for travelling electric hoist blocks, etc., is not present in the case of the "Vizard" system which has recently become available from the VAUGHAN CRANE CO., LTD., West Gorton, Manchester, 12. This conductor track will work at up to 600 V at 25 A and is suitable for straight or curved tracks down to 8ft radius. The associated enclosure is made of perforated galvanized steel in 10ft lengths, the entry slot for the towing bar attached to the trolley being at the side, thereby making for increased safety when long bars are handled.

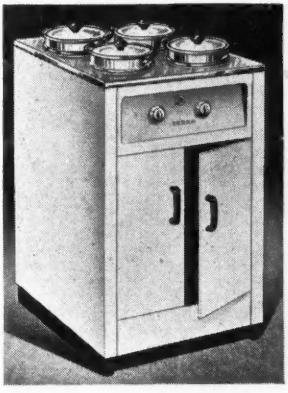


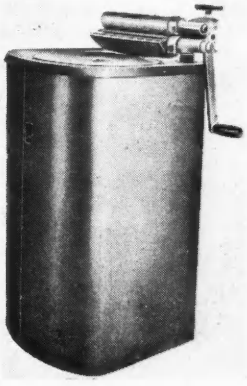
Protected conductor track for hoist blocks

Small Washing Machine

To their "de luxe," standard and "Washette" washing machines H. FISHER

Arora bain-marie and hotcupboard, and (right) Fisher "Junior" washer





(OLDHAM), LTD., Glodwick Road, Oldham, have now added the "Junior" model which, complete with hand wringer, sells at £28 (plus purchase tax in this country). It has a capacity of about 4 lb of dry clothes and can be placed under the draining board when not in use. The wringer, which can be stowed away in the base, is at present hand-operated, but provision is made for a power-operated unit which will be available later.

The agitator and gear box are of the normal Fisher design and the ⅓ h.p. motor is fitted with a thermal overload cut-out. A switch is provided for starting, and draining is done by hosepipe. The machine is mounted on castors. The standard finish is cream stone enamelled casing with mottled grey vitreous enamelled tub. Delivery commences in September.

For the home market the "Washette" machine is now available with the agitator unit in the bottom instead of the top.

Lighting Fitting Suspension

Apart from the Kenwell anti-vibration socket cover for the suspension of lighting fittings by conduit in industrial establishments SMALL PRESSURE DIE CASTINGS (BACUP), LTD., Lanehead Works, Bacup, Lancs, is now also making an angle ball socket cover of similar design. This is intended for suspending fittings from B.S. 2in centre conduit boxes mounted on north-light factory roofs or any sloping roof which subtends an angle of about 30 deg to the horizontal. It is available adapted for ¾ or ⅝in electrical conduit and by provision of the fixing flange at 30 deg, full universal movement of the ball and socket is maintained.

Mixing Machine Attachments

New accessories brought out by THORN ELECTRICAL INDUSTRIES, LTD., 105-109, Judd Street, London, W.C.1, for use with the "Mary Ann" mixer include a small carborundum wheel grindstone (12s 6d); a plastic dust cover (7s 6d); a fruit juice extractor (18s plus, in this country, 4s 6d purchase tax); and a polishing outfit (price not yet fixed), comprising a combined mop-holder and two polishing mops (sheepskin and fabric).

Unbreakable Plug Top

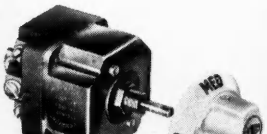
It is announced that substantially constructed rubber-covered plug tops for industrial use are now being made by JULIUS SAX & CO., LTD., 24, Commerce Road, Brentford, Middlesex. Both 3-pin 5 A and 3-pin 15 A versions are available. These plugs can be dropped without sustaining damage.

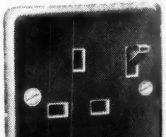
Smaller Cooker Switch

A re-designed cooker switch with a porcelain base is offered by TURNRIGHT CONTROLS, LTD., West Hill, Hoddesdon, Herts. It is of slow make-and-break construction for use on a.c. mains only, has a rating of 15 A or 250 V, and the height and width have been reduced to 1⅞in. Protection from the back of the cooker mounting panel to the terminals remains the same as that which is provided in the case of the present standard switch.

Socket-Outlet

The latest addition to the products of NETTLE ACCESSORIES, LTD., Harper Road, Wythenshawe, Manchester, is a 13 A, flush-mounted switched and shuttered socket-outlet. It is suitable for use with B.S. 1363 boxes and allows ample wiring space, being available with either porcelain or anti-track moulded base. The socket plate is interchangeable with standard 13 A flush socket-outlets and can be converted to surface mounting by the use of the "Nettle" surface pattress.





Left: Polishing outfit for use with "Mary Ann" mixer. Below: Turnright cooker switch and Nettle 13 A switched and shuttered socket-outlet

Cooker Production

Improved Facilities at Manchester Works

WITH the recent transfer of production from Coalbrookdale, Shropshire, back to Corporation Road, Audenshaw, Manchester, Falco Electrical Appliances, Ltd., will not only have improved facilities at their disposal for the manufacture of electric cookers, fires and irons, but will also be able to improve further their servicing arrangements. The company moved from Coalbrookdale last year, when the factory space there was required by another branch of the Allied Ironfounders' organization.

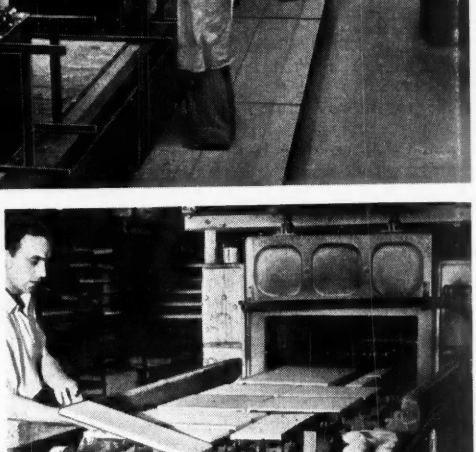
The factory now occupied by Falco is capable of double the output of cookers possible at Coalbrookdale, and there is room for expansion. A specialized technical staff has been built up and the sales staff has recently been increased. The spares organization can give a same-day service, while repairs are normally effected within twenty-four hours.

Although the designs of standard products generally have not been changed to any extent, the improved facilities now available have resulted in more modern assembly methods and a better finish. The continuous vitreous enamelling plant is claimed to be one of the most up-to-date in the country, and a well-equipped research and testing laboratory demands a high standard of performance.

To ensure a square chassis the first assembly operation is the placing of the front, base and corner angles in a jig. After adding the lagging, the welded grill compartment is fitted and the assembly is then placed on a moving conveyor. The oven door is then put on, followed by the wiring, switches, thermostats and fuse brackets. A fitter then beds the oven, each one being individually ground to fit its own frame. A space is purposely left at the bottom of the door for ventilation. A panel is attached to the outside of the door, which is then lagged, and at the same time another operator adds the boiling plate and grill runners, adjusting screws, etc. With the boiling plates and grill boilers fitted and adjusted the completed cooker passes on for test.

Wiring up a cooker at the Falco works and (right) completed cookers receiving the final inspection

Above: A view of the beginning of the main cooker assembly line



Right: The continuous vitreous enamelling plant is one of the most up-to-date of its kind in the country

Below: In the dispatch department

After a 1,500 V flash test to ensure that the insulation is in order, a load test is carried out on each plate and oven, the automatic controls being checked. When faults (if any) have been rectified there is a final inspection after the various accessories—oven and grill pans, grids, shelves, chart, etc.—are put in. From the end of the conveyor track the cooker is removed for packing and labelling ready for dispatch.

At present three types of cooker are produced, of basically similar design conforming to E.D.A. interchangeability standards. All of them have 13in cube ovens with drop-down doors fitted with a friction device preventing them from falling open and enabling them to be left in any desired position. Thermostatic control is provided for all ovens and most of the boiling plates are now fitted with "Simmerstats."

The cheapest of the three models manufactured, the Falco 17, is available in grey finish only. The other two, the 15 and 16, can be had also in cream, cream and green, and white (with black hobs). These two cookers are identical except that the 16 has a 6¼in boiling plate in addition to the normal 8in unit. Both types have large utility drawers at the bottom.

Apart from the standard type of cooker, the company also makes a table model suitable for the smaller household. A feature of the range of fires, which are at present being produced in limited quantities only owing to restrictions, is the robustness of the attractive pressed-steel construction.

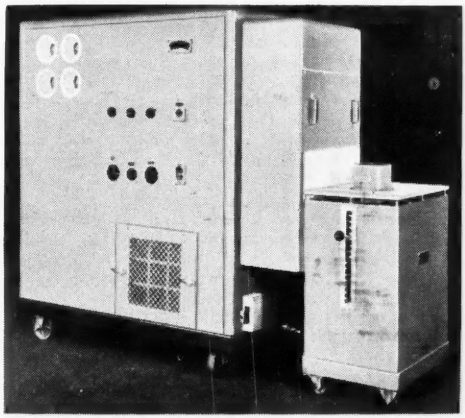
Induction Furnace for Norway

Specially Designed for Metallurgical Research

EQUIPMENT recently exported to Norway includes a 5 kW induction furnace specially designed in the Research Laboratories of the General Electric Co., Ltd., for metallurgical research by the Norwegian Government. This furnace is housed in a sheet-metal cabinet with a top of heat-resisting material. A lever operating through a notched gate is used to raise or lower the crucible. The furnace is covered with a lid which has a small hole for observing the charge or the insertion of a pyrometer. The lid, table top and removable rear panel are all fitted with safety switches to prevent power being switched on when they are not in position.

Two crucible assemblies are used with the equipment, a graphite crucible for melting metals with which contact with graphite is permissible, also for melting non-metallic charges; and a refractory crucible for ferrous charges.

Power for the furnace is supplied from a standard G.E.C. 5 kW high-frequency heating generator and typical performance figures for the plant are: copper, 4½ lb (2 kg) raised to melting point in about 15 min; steel, 2¼ lb (1 kg) melted in 12-15 minutes. The overall power consumption of the equipment when in full operation is 10 kW, power being taken from a 400-440 V, three-phase supply.



G.E.C. induction furnace for the Norwegian Government (right) with high-frequency generator (left)

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

The Hackbridge & Hewittic Electric Co., Ltd.—In his statement presented at the annual general meeting on 3rd August Mr. T. F. Lister, chairman and managing director, said that extensions to the Hersham factory were in full production towards the end of 1949 and considerable benefit was being reaped from the extra space and improved working conditions. He had made arrangements while in Canada to extend the company's facilities there by putting down equipment for the manufacture of rectifier bulbs. The output from the Transformer Department had shown a progressive increase during the past two years and the Rectifier Department continued to be fully employed. He hoped that the time was not too far distant when the long overdue electrification of more of the railways would be taken in hand so that they might share in the supply of the rectifiers required. The order book in all departments was again a record.

The Morgan Crucible Co., Ltd., reports that the group profits for the year ended 31st March, after all charges but before taxation, amounted to £1,135,046, compared with £1,195,109 in the previous year. U.K. taxes took £558,712 (£513,274) and foreign taxes £32,586 (£30,848), leaving £543,748 (£650,987). The amount of the group profit attributable to the holding company was £502,951 (£615,664). A final dividend of 8¾ per cent again makes 12½ per cent for the year.

Electrical Components, Ltd., reports a group profit for the year ended 31st March last, less taxation, of £54,067, as compared with £50,013 for the preceding period (parent company nine months, subsidiaries twelve months). The final dividend is 12½ per cent, making 20 per cent for the year.

Murphy Radio, Ltd.—Arrangements are now nearly complete for an application to the Stock Exchange for permission to deal in the whole of the issued ordinary shares.

George Kent, Ltd., reports a group trading profit for the year ended 31st March amounting to £448,235 (£394,209). After providing for taxation £186,430 (£175,757) and other charges, there remains £186,537 (£126,615). After various allocations a final dividend of 7 per cent is paid, making a total distribution of 10 per cent (same) and the carry-forward is: George Kent proportion £183,721 (£164,553), minority shareholders £5,935 (£1,206).

Aberdare Cables, Ltd., reports a consolidated trading profit for the year ended 31st October last of £355,453, as compared with £241,096 for 1948-49, and a net profit of £139,742 (against £64,178). It is proposed to pay a second interim dividend of 7½ per cent, making 20 per cent for the year, and to carry forward £144,858 (against £61,630 brought in).

Falk, Stadelmann & Co., Ltd., are maintaining their interim dividend at 10 per cent.

NEW COMPANIES

Elmech (1950), Ltd.—Registered 31st July. Capital £5,000. To acquire the business of a manufacturer of electric lighting equipment and other electrical goods carried on by John Mott as "The Elmech Co.," at Salisbury Road, Broadheath, Altrincham. Permanent directors: J. Mott and June Woods. Secretary: Gladys Poole. Regd. office: Salisbury Road, Broadheath, Altrincham.

Electric Motor Services (Canterbury), Ltd.—Registered 31st July. Capital £1,000. To acquire the business of maintaining and repairing electric motors now carried on by Wm. A. Woolacott at King Street, Canterbury, as Electric Motor Services. Directors: Wm. A. Woolacott (permanent) and Joan Woolacott. Secretary: H. M. Hawkins. Regd. office: King Street, Canterbury.

W. J. H. Lambert, Ltd.—Registered 7th July. Capital £1,000. Electrical engineers, manufacturers of and dealers in all kinds of electrical apparatus, etc. Directors: E. C. Kent, A. D. Wells, and G. A. Lackington. Regd. office: Harlequin Avenue, Great West Road, Brentford, Mddx.

Sarum Electric, Ltd.—Registered 8th July. Capital £1,000. Electrical, radio, television, mechanical, civil and general engineers, etc. Directors: G. E. Sparrow, Mrs. Annie Sparrow, and C. A. Sparrow. Regd. office: 32, Chipper Lane, Salisbury, Wilts.

Wm. Hodgkins & Co., Ltd.—Registered 15th July. Capital £5,000. To carry on the business of electrical engineers and wholesalers (being the business formerly carried on by Wm. I. Hodgkins as Wm. Hodgkins

& Co., at 19, St. George Street, Leicester). Directors: Wm. I. Hodgwins (permanent), and H. S. Kirk. Regd. office: 19, St. George Street, Leicester.

L. H. Durrant & Co., Ltd.—Registered 15th July. Capital £5,000. To acquire the business of radio and electrical goods dealers and contractors carried on at 330, High Street, Harborne, Birmingham, as L. H. Durrant & Co. Directors: L. H. Durrant and Mrs. Mary T. Durrant. Regd. office: 330, High Street, Harborne, Birmingham.

Dunn & Dyer (Electrical), Ltd.—Registered 15th July. Capital £100. Electrical engineers and contractors, etc. Directors: L. Dyer, J. T. Dunn, A. J. Dyer and A. F. Dyer. Regd. office: Merriotts Place, Newport, Mon.

Electrical Enterprises, Ltd.—Registered in Dublin 1st July. Capital £2,000. To manufacturer, assemble, repair and deal in apparatus, plant and machinery etc. Directors: J. J. Byrne and H. J. Doran, 106, Dolphins Barn Road, Rialto, Dublin.

Jones, Morris & Co., Ltd.—Registered 14th July. Capital £3,000. Electrical engineers, wholesalers, retailers and contractors, etc. Directors: E. M. Jones, Clara Jones and F. W. Jones. Regd. office: 394, Barlow Moor Road, Chorlton, Manchester, 21.

W.H. Instruments, Ltd.—Registered 19th July. Capital £100. Manufacturers of and wholesale and retail dealers in electronic and precision instruments, etc. Solicitors: Sandford Mervyn Taylor & Co., 5 and 6, Clements Inn, Strand, W.C.2.

Thomas & Beauchamp, Ltd.—Registered 26th July. Capital £1,000. Electrical engineers and contractors, etc. Directors: W. F. Jones-Thomas and C. A. Beauchamp. Secretary: W. E. Price. Regd. office: 331, Havant Road, Farlington, Hants.

Woolley's Radio and Electrical Supplies, Ltd.—Registered 26th July. Capital £1,000. Director: L. H. Lee, A. H. Knight, R. J. Picken and G. J. Hale. Secretary: G. J. Hale. Regd. office: 232, Rookery Road, Handsworth, Birmingham, 21.

W. V. Mackay & Sons, Ltd.—Registered in Edinburgh 30th June. Capital £4,000. Dealers in and manufacturers of electrical goods and equipment, etc. Directors: E. W. V. Mackay, 63, Kilpatrick Gardens, Clarkston, Renfrewshire, and R. S. Mackay, 4, Third Avenue, Kings Park, Cathcart, Glasgow.

Electronic Service (Hallamshire), Ltd.—Registered 15th July. Capital £5,000. To acquire the business of a tape recorder and television apparatus manufacturer carried on by David Sockett at 93-5, Button Lane, Sheffield. Directors: D. Sockett and E. G. Summers. Regd. office: 93, Button Lane, Sheffield.

Prince Palmer (Chelmsford), Ltd.—Registered 24th July. Capital £5,000. Electrical engineers and contractors, wireless and television engineers, etc. Directors: J. W. Palmer and Mrs. E. Palmer. Regd. office: 23, London Road, Chelmsford.

David Fisher (Barnbank), Ltd.—Registered in Edinburgh 11th July. Capital £8,000. Electrical engineers and contractors, etc. Subscribers: D. Fisher and R. Fisher. Regd. office: 341, Glasgow Road, Barnbank, Hamilton.

Parry's Electrical Co. (Manchester), Ltd.—Registered 24th July. Capital £500. Electrical and general engineers, etc. Directors: R. C. Parry and Sophia Parry. Regd. office: 89, Windsor Road, Prestwich, Lancs.

INCREASE OF CAPITAL

Donovan Electrical Co., Ltd.—Increased by £30,000, in £1 ordinary shares, beyond the registered capital of £50,000.

RECEIVER APPOINTED

Stokes Appliances, Ltd.—H. Darrell, C.A., of 1, High Street, Croydon, Surrey, was appointed receiver on 20th July, 1950, under powers contained in debentures dated 29th June and 11th November, 1948.

LIQUIDATIONS

Caersws Electric Supply Co., Ltd.—Winding up voluntarily. Claims to the liquidator, Mr. D. R. Morgan, 51-52, Broad Street, Newtown, Montgomeryshire, by 19th August.

Rushlite Batteries, Ltd.—Meetings, 1st September, at 4, Princess Street, Wolverhampton, to receive an account of the winding-up by the liquidator, Mr. A. L. Blower.

BANKRUPTCIES

W. H. B. Banks, radio and television dealer, lately carrying on business at 64, High Street, Chorlton-on-Medlock, Manchester.—Receiving order made 24th July on a creditor's petition.

F. Robinson, lately carrying on business at 100, Henshaw Road, Small Heath, Birmingham, as a refrigerating and electrical engineer.—Last day for receiving proofs for dividend 16th August. Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham, 2, Official Receiver.

FINANCIAL SECTION

STOCKS and SHARES

THE holiday season may now be said to have set in and, as already mentioned, it adds a contribution to the restraint exercised by the gravity of the news from the Far East over the Stock Exchange markets as a whole. Members of the House admit amongst themselves that it is surprising that prices keep so firm as they do. Obviously, people are not going to be frightened out of their investments, for when stock does come to market, it usually has little difficulty in finding a home at reasonably good prices.

Prices in the gilt-edged market shift a little this way and that in accordance with the war news, but after the first six weeks of the crisis they have lost on balance nothing more than their initial and moderate recoil. Over the past week, the new 3½ per cent British Electricity stock 1976-79 shows practically no net change at 99⅞ and is thus still above the price of 99 at which it was issued in May. British Electricity 3 per cent 1968-73 has lost a small fraction on the week at 95 and the 1974-77 issue holds at around 94. A matter at the root of gilt-edged confidence is, of course, the state of the nation's gold and dollar reserves. It is calculated that the projected scale of American expenditure on defence in many parts of the world may help materially the improvement already recorded in the latest figures.

G.E.C. Report

Full accounts published last week by the General Electric Company showed a million-pound increase in the group trading profit. Ordinary shareholders are to receive 17½ per cent as before, so that, despite higher appropriations for taxation and depreciation, there remain substantial reinforcements in the balance sheet for reserves against stock and plant replacement costs and against the general contingencies which receive mention in the report. Last year's issue of an £8 million loan has virtually erased the overdraft, and with cash standing at the comfortable figure of £4 million the financial position is one to be envied at a time when shortage of working capital is a common industrial plague. Earnings for the ordinary dividend work out at over 60 per cent, which gives an eminently secure appearance to the return of £4 3s 6d per cent from the shares at the advanced price of 83s 9d.

Lancashire Dynamo New Shares

New £1 ordinary shares issued last month to existing holders are quoted at about 11s premium on the offered price of 80s. They can be bought in the form of renounced allotment letters free of transfer stamp, which saves the purchaser over 1s 6d per share—the equivalent of more than half a year's net income on the basis of the regular 22½ per cent distribution in recent years. Assuming the maintenance of that rate, the yield is 4.9 per cent. These new shares do not qualify for any interim payment which may be made for the current year, but thereafter rank equally with the old. They are partly paid, with the final call of 30s per share due on 1st October.

Week's Price Changes

The changes in prices since a week ago are comparatively few. British Insulated Callender's, 31s, Brush, 5s 6d, Lucas, 31s 6d, and Murex, 32s, show small improvements. Elsewhere, De La Rue, 23s 3d, Ward & Goldstone, 37s, and International Combustion, 16s 3d, are harder. British Electric Traction deferred gained 10 points, at 445. Great Northern Telegraphs are 15s up at 13¾. Babcock & Wilcox at 63s 6d and Vickers at 30s 9d. reflect the rising tendency of shares in the "heavy" industry market. Aberdare Cables £1 ordinary shares were quoted at 55s 6d at the time of the announcement that they are to be sub-divided into 5s shares.

Radio Oscillations

Cross influences are at work on shares connected with radio, television and—a side of the industry brought into prominence by current events—with radar. Last month the market received practical encouragement from the excellent annual accounts produced by Pye and E. K. Cole. Share prices, however, have been kept in check by considerations about the problematical effects of a rearmament programme upon private expenditure, and, also, upon the promising career of television. On the other hand, radar has again come into the picture as a possible contender for a much larger share of the manufacturing capacity and skill of the principal companies. Pye deferred are 9d better on the week, at 32s x.d. E.M.I. are 6d higher at 21s, Cossors are maintained at 8s. Deccas are a trifle harder at 13s, despite warnings of a considerable recession in the past year's profits. The new year, however, has started well.

ELECTRICITY SUPPLY

Cheaper Electricity in South East
Revised Scottish Domestic Tariff

THE South Eastern Electricity Board announces reduced charges in many districts of Kent, Surrey and Sussex. Present "unit" charges of more than 1d under all domestic and commercial two-part tariffs in S.E. England are to be reduced to 1d, the reduction in some cases being more than ½d per kWh (or 33⅓ per cent). Simultaneously, fixed charges in Peacehaven and Crawley will be reduced. In Epsom, the fixed charges will be slightly increased to bring them nearer to those in other parts of the Area, but this should be more than offset by the reduction of ½d (20 per cent) in the "unit" rate. In Ashford (Kent) an existing complicated and expensive tariff for domestic consumers will be withdrawn and consumers will have the choice of a cheaper two-part tariff or a new rate of 6d per kWh in place of the present commencing rate of 9.6d or more. "Unit" charges under domestic and commercial two-part tariffs in Cranleigh will be reduced by 5 per cent and the present cash discount of 2½ per cent will be discontinued. The following districts are affected by the reductions: Ashford, Banstead, Bexhill, Canterbury, Cranleigh, Crawley, Dorking, Eastbourne (rural area), East Grinstead, Epsom, Herne Bay, Horsham (rural area), Leatherhead, Peacehaven, Tonbridge (rural area), Walton-upon-Thames, Weald, Weybridge, and Whitstable.

The total number of consumers who will benefit from the tariff alterations, which operate immediately after the reading of meters for the September quarter, is 62,000. Last year the Board announced flat-rate reductions in 13 districts, and the cheaper prices now introduced are in continuation of the policy agreed between the Board and the Consultative Council for the standardization and simplification of tariffs.

New S.W. Scotland Tariff

Revised charges for electricity supplied to domestic consumers by the South West Scotland Electricity Board will, it is announced, be introduced on 15th October. The new scale, which is being adopted as a further means of simplifying and standardizing the many forms of tariff at present in operation, will mean slightly higher payments in some areas, including Glasgow, but a decrease in certain others. The new scale of charges will replace more than 50 different domestic tariffs now in operation in the Board's area. The primary charge will be based on the number of rooms in the consumer's house, 4d per kWh being charged for the first 10 kWh per room per quarter (6d for prepayment meter supplies). For all additional consumption the present rate of ¾d per kWh will continue. In view of the low rates enjoyed by the former Glasgow Corporation consumers, the Board has decided to leave the price of the primary kWh at 3d for the present, and to continue that concession also to those consumers in Rutherglen previously charged at the Glasgow rates. There will, however, be a variation in the number of kWh charged at the primary rate. In the former Clyde Valley Co. and Glasgow Corporation areas consumers in four-apartment houses, for example will pay from 7d to 2s 10d a quarter more.

New Collier

S. P. Austin & Sons, Ltd., Sunderland, have handed over after trials the collier *Brent Knoll* (1,700 tons), the last of four vessels of this type ordered by the British Electricity Authority. The vessel has a speed of 11 knots.

Eastern Area Activities

It is reported in the *Eastern Electricity Bulletin* that in an effort to revive the traditional duck breeding industry, an exhibition was held recently in the Aylesbury Town Hall (Chilterns Sub-Area). Demonstrations were given during the afternoon and evening by the district housecraft adviser on the preparation and cooking of birds, and the Board's exhibit included an incubator, brooder, egg-washer and plucker.

In the Fens Sub-Area commercial refrigeration sales in the mouth of June amounted to over £2,750.

Fifteen cables have been laid across the River Yare at Great Yarmouth (Norfolk Sub-Area) at a depth of 7ft below the river bed which, at the point of crossing, is about 270ft wide.

A large industrial consumer in the Suffolk Sub-Area who, in addition to taking

a supply from the Board, has two turbo-alternators installed, recently made an urgent call for assistance. At the time when one of the turbo sets was being overhauled, trouble developed on the second set and a large section of the factory had to be shut down. Within a few hours, and by working throughout the night, a 500 kVA transformer was installed and connected up, enabling the section of the factory to be put back into production.

Installation Costs

Middlesbrough Town Council, in conjunction with the North Eastern Electricity Board, is considering what economies can be made in the electrical installation in new houses. At present the Council is spending about £44 per house on electrical work, and efforts are to be made to reduce this to about £30.

Purchase of Power Station

As from 1st October, the B.E.A. Merseyside and North Wales Division will become responsible for the operation of an additional power station, the Authority having recently agreed with the Board of Trade to purchase as from that date the 12,150 kW power station on the Marchwiel Trading Estate at Wrexham. The station is at present managed by the Wales and Monmouthshire Industrial Estates, Ltd., on behalf of the Board of Trade, and is used by the company for providing supplies of steam and electricity to factory tenants on the Trading Estate.

Scottish Rural Electrification

Last week Mr. J. Mann, convener of Lanark County Council, switched on an electricity supply at Leadhills, which is situated in the Lowthers 1,400ft above sea-level and is one of the highest hamlets in Scotland. The district was formerly the site of lead mines and in the sixteenth century gold mining was carried on there. Mr. J. Gogan, chief commercial officer of the S.W. Scotland Electricity Board, said that there were 144 villages in Lanarkshire and Leadhills was the 111th to be connected; 75 per cent of the houses in the village were already wired.

Overhead Lines

Horncastle R.D.C. has agreed to support the Planning Committee's objections to proposals of the East Midlands Electricity Board for overhead lines at Scamblesby, but not at Baumber. The Planning Committee is pressing for the lines to be placed at the rear of the houses and not on the grass verges, saying that the Board's proposals would mean having poles on the opposite side of the road to the existing telegraph poles, with the lines crossing the road at a number of places. The Board contends that to meet the Committee's objection would entail additional costs, while there would be difficulty in obtaining wayleaves on private property. It is also pointed out that the poles could be used for street lighting, though the Planning Committee considers this development unlikely. Horncastle R.D.C. agrees that poles at the side of the main road at Scamblesby would be a danger to traffic, but at Baumber it considers the grounds for objection insufficient to justify delay in a village obtaining electricity.

Malvern Objections

Malvern U.D.C. is objecting to a proposal of the Midlands Electricity Board to erect an overhead line from an existing line in West Malvern to a proposed substation. The Council supported the Public Health Committee's view that a line would be detrimental to one of the most beautiful parts of the district, and Mr. J. K. Clarke observed that it was time the Council made the Board realize that it would not tolerate any further extensions of overhead lines in the area. Such lines should be restricted to rural districts, he said, where possibly they were the only form of distribution.

Greek Power Scheme

Work will start on 15th August on an ambitious electrification scheme in Greece. It involves total expenditure of some $80 million (about £26,600,000) and its long-term effects are expected to produce a far-reaching improvement in Greece's economic conditions.

The scheme will increase the installed capacity by 165,000 kW by means of one thermal and three hydro-electric plants. Some 630 miles of 150 kV transmission lines will be laid and about 25 step-down stations will be built under the project.

Power from Natural Steam

Expenditure of £80,000 on investigating the possibility of natural steam being used for the generation of electricity has been approved by the New Zealand Government.

Tramway Abandonment

Plans were recently announced for the replacement of London's trams by buses at a cost of over £9,000,000. Conversion is to start on 1st October and will be carried out at three-monthly intervals over a period of two years. The Kingsway tunnel will become redundant as far as London Transport is concerned.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

9173. Cossor, Ltd., A. C., Bedford, L. H., and Jofeh, L.—Electrical apparatus. 12th May, 1945. (643005)

1945

10669. British Thomson-Houston Co.. Ltd.—Multiple flash-lamp devices. 27th April, 1945. (643261.)

14076. Sperry Gyroscope Co.. Inc.—Germanium dry rectifiers and detectors. 4th June. 1945. (643200.)

26406. British Thomson-Houston Co., Ltd.—Capacitors. 10th October. 1945. (643006.)

29151. British Thomson-Houston Co.. Ltd.—Fluid-operated electric circuit-breakers. 2nd November. 1945. (643202.)

32950. Marconi's Wireless Telegraph Co., Ltd.—Magnetron electron-discharge device generator. 5th December, 1948. (643007.)

1946

15616. Bellecombe, F. M. L. G. de.—Television systems. 23rd May, 1946. (Cognate application 15617, 12th November, 1945.) (643271.)

18559. Standard Telephones & Cables, Ltd., and Foulkes, C. H.—Electron-discharge devices. 13th June, 1947. (643008.)

21944. Farnsworth Television & Radio Corporation. —Light modulating system. 23rd July, 1946. (643210.)

26138. Igranic Electric Co., Ltd.—Electric control apparatus particularly for effecting a given operation of an electromagnetic device upon a movable element reaching a given position. 30th August, 1946. (643211.)

30172. Philips Lamps, Ltd.—Circuit arrangements for distributing signal pulses. 9th October, 1946. (643272.)

33731. British Thomson-Houston Co., Ltd.—Target structures for electron-discharge devices. 13th November, 1946. (643011.)

35051. British Thomson-Houston Co., Ltd., and Stokes, J. A.—Electric control systems. 23rd April, 1948. (643013.)

1947

554. Ultra Electric, Ltd., Sturgeon, H. G., Sturrock, G. M., and Allanson. J. T.—Speed control apparatus. 7th January, 1947. (Addition to 603107.) (643278.)

1291. Philco Corporation.—Cathode-ray tubes for television. 14th January, 1947. (643280.)

1777. Eitel-McCullough, Inc. — Thermionic valve. 20th January, 1947. (Cognate applications, 1778, 27th April, 1946, and 1779, 29th May, 1946.) (643281.)

4343. Sylvania Electric Products, Inc.—Manufacture of electron tubes. 14th February, 1947. (643149.)

5525. Radio Corporation of America.—Beam-deflecting circuits for cathode-ray tubes. 26th February, 1947. (643150.)

6785. Philips Lamps, Ltd. — Electronic circuits for producing saw-tooth currents. 11th March, 1947. (643152.)

7039. British Thomson-Houston Co., Ltd.—X-ray generators. 13th March, 1947. (643283.)

9498. Brush Electrical Engineering Co., Ltd., and Banks, J. W.—Method or process for fixing turbine blades or the like to discs or wheels. 26th September, 1947. (643212.)

9689. Philips Lamps, Ltd.—Electric-discharge tubes. 11th April, 1947. (643023.)

10282. Bendix Aviation Corporation. — Television receiver. 17th April, 1947. (643155.)

15005. Standard Telephones & Cables, Ltd.—Electron-discharge tube construction. 6th June, 1947. (643028.)

17682/3. Western Electric Co., Inc. — Coupling arrangements for use in wave transmission systems. 4th July, 1947. (643162/3.)

17921. English Electric Co., Ltd., and Binney, E. A. —Engine-driven electric generating plant. 6th August, 1948. (643030.)

18522. British Thomson-Houston Co., Ltd.—Radio locating equipment. 11th July, 1947. (643031.)

20442. British Thomson-Houston Co., Ltd.—Methods of forming selenium rectifiers. 29th July, 1947. (643165.)

20865. British Thomson-Houston Co., Ltd.—Time measuring apparatus. 31st July, 1947. (643167.)

22098. Hoover, Ltd.—Suction cleaners. 8th August, 1947. (643083.)

23352. Marconi's Wireless Telegraph Co., Ltd.—Modulation monitoring arrangements for television and like transmitters. 22nd August, 1947. (643171.)

23553. Standard Telephones & Cables, Ltd.—Electric-discharge apparatus. 26th August, 1947. (643084.)

27174. Parsons & Co., Ltd., C. A., and Martin, A. E.—Infra-red analyzing apparatus. 29th September, 1948. (643086.)

27576. Gazda, H. O., and Viecelli, L.—Electric accumulator batteries. 14th October, 1947. (643087.)

29373. Bondy, O. (Laub, F. L.).—Commutators for electric machines. 4th November, 1947. (643038.)

29662. Roeterdink, C.—Electric machine having radially accessible grooves for the winding. 7th November, 1947. (643289.)

31207. Small Electric Motors, Ltd., and Mathews, S. R.—Start-and-stop mechanism for gramophones and the like. 15th November, 1948. (643177.)

33005. General Electric Co., Ltd., and Turrall, J. C. —D.C. electric motor control systems. 16th November, 1948. (643180.)

34741. Metropolitan-Vickers Electrical Co., Ltd.—Electron-discharge devices. 30th December, 1947. (643092.)

1948

406. Westinghouse Electric International Co.—Electrical devices having vitreous envelopes with electrodes therein. 6th January, 1948. (643052.)

627. Metropolitan-Vickers Electrical Co., Ltd., and Birch, S. — Spring-loading device for adjustment screws or the like. 24th December, 1948. (643095.)

822. Philips Electrical, Ltd.—Circuits for demodulating frequency-modulating oscillations. 10th January, 1948. (643290.)

874. Allmanna Svenska Elektriska Aktiebolaget.— Arrangement in electric compressed-air-blast circuit-breakers. 12th January, 1948. (643096.)

2728. General Electric Co., Ltd., and Ridge, F.— Electric switches having overload release devices. 27th January, 1949. (643187.)

4265. Westinghouse Brake & Signal Co., Ltd., Stevens, S. A., Duckitt, H., and Allen, R. C. J.— Regulating apparatus for alternating electric current supply systems. 21st January, 1948. (643108.)

4754. Guardian Electric Manufacturing Co.—Electromagnetic relay. 18th February, 1948. (643057.)

5430. Bickell, S. F.—Spring contacts for electric fuses, switches and like electric devices. 22nd February, 1949. (643110.)

6122. British Thomson-Houston Co., Ltd.—High-frequency coupling device. 27th February, 1948. (643191.)

6865. Standard Telephones & Cables, Ltd.—Oscillator circuit responsive to Hall effect. 5th March, 1948. (643294.)

8985. Pye, Ltd., and Jackson, D.—Chassis for television receivers. 26th February, 1949. (643115.)

9328. Triggs, W. W. (Farnsworth Research Corporation).—Electric frequency modulation system. 2nd April, 1948. (643195.)

10976. Lucas, Ltd., J., and Foxall, H. H.—Combined push-button and lever-operated electric switches. 5th April, 1949. (643214.)

12516. British Thomson-Houston Co., Ltd.—Method of preparing tris (trimethylsilyl) borate. 6th May, 1948. (643298.)

12878. Forges & Ateliers de Constructions Electriques de Jeumont.—High tension air-blast circuit-breakers. 11th May, 1948. (643216.)

13631. Reyrolle & Co., Ltd., A., and Allan, A.—Spring-operated electric circuit-breakers. 20th April, 1949. (643218.)

14667. Hawker Aircraft, Ltd., and Sanders, G.—Transmission devices for electric motors. 2nd May, 1949. (643001.)

15184. Communications Patents, Ltd., and Downing, R. K.—High-frequency dielectric heating apparatus. 4th July, 1949. (643219.)

16631. Burgess Battery Co.—Method of electrolytically forming silver chloride. 21st June, 1948. (643223.)

17846. Thornton, A. A. (Magnavox Co.).—Electrical condensers and method of manufacture. 2nd July, 1948. (643128.)

16835. Imobersteg, W. — Small electric soldering irons. 12th November, 1948. (643125.)

18316. Edison, Swan Electric Co., Ltd., Wilman, D., and Kent, J.—Fittings for tubular elongated light sources. 5th July, 1949. (643226.)

19040. British Thomson-Houston Co., Ltd.—Spring washers. 15th July, 1948. (643228.)

21215. English Electric Co., Ltd., and Braikevitch, M.—Gate valves. 5th August, 1948. (643238.)

22963. Telegraph Construction and Maintenance Co., Ltd., and Mildner, R. C. — High-frequency electric cables. 29th July, 1949. (643250.)

23239. Switchgear & Cowans, Ltd., Rowbotham, J. L., and Halacsy, A.—Electrical remote-control systems. 17th August, 1949. (643251.)

25079. Wild-Barfield Electric Furnaces, Ltd., Ellis, C. C., and Sims, C. W. — Electric furnaces. 2nd September, 1949. (643256.)

1949

1982. Cornelius, J. R.—Electronic comparator for analyzing ferrous and non-ferrous material by non-destructive methods. 14th December, 1949. (643318.)

31636. Brush Electrical Engineering Co., Ltd., and Banks, J. W.—Turbine or like wheels. 26th September, 1947. (Divided out of 643212.) (643259.)

Theatre Lighting System

Control by Desk Console

THE recent electrical re-equipment of the Palace Theatre, Manchester, has provided it with one of the most up-to-date theatre lighting systems in the country. This theatre, originally known as the Manchester Palace of Varieties, was built in 1891 and practically rebuilt in 1913.

At the end of the war work began in the theatre, and it has now been completely rewired, fitted with new stage lighting and controls, a "Keepalite" emergency lighting system, counterweight scenery lifting gear, and a new stage floor. Over £20,000 has been spent on the stage alone.

The stage lighting load is 350 kW, and before the installation of the new equipment it was controlled by several electricians from a large switchboard gallery over the "prompt" side of the stage. This arrangement has been replaced by a modern desk-console made by the John Compton Organ Co., Ltd.

The motor-operated dimmers are housed in a room under the stage, and the single operator can select the number and colour of the stage lights he wants and control the rate at which they are faded in or out. He can also prepare the console in advance for a different combination of lights so that the change-over from one to another can be instantly carried out.

The "Keepalite" equipment comprises 115 "Chloride" DBG 5 cells and a charging control cubicle, the cells being the sealed-in Planté type with a capacity of 150 Ah at the 10-hour rate.

This equipment can supply the 230 V secondary stage and auditorium lighting circuits with 8 kW for three hours in the event of a mains failure.

The benefit of the system was demonstrated in January, when supplies were cut off for about 45 minutes. The battery-powered secondary circuits took over, enabling the show to go on and finish almost on time.

The principal contractors were W. H. Smith (Electrical Engineers), Ltd. (wiring installations) and the Strand Electrical and Engineering Co., Ltd. (stage lighting equipment).

Line Equalization

THE July issue of the "Procedure" of the Society of Relay Engineers is wholly taken up by a paper entitled "Line Equalization with special reference to Programme Circuits," and a report of the discussion which followed when it was read by Mr. H. J. Marchant (G.P.O.), before the Society in London last October. This authoritative paper is a work of some importance, and it contains a wealth of data concerning a subject on which there is little published information.

Circulation of the Society's publications has hitherto been restricted, but this particular 54-page issue is available, price 5s, to all interested persons on application to the secretary at Albion Road, Kettering.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Altrincham. — 18th August. Corporation. Trunk road lighting. (See 4th August issue.)

Argentina.—22nd August. Director-General of Water and Electric Power. Ten diesel-electric d.c. generating sets (25 to 100 kW). (C.R.E. (I.B.) 59774/50. Ten/1464/I.B.3.)*

Australia.—QUEENSLAND.—12th October. City Electric Light Co., Ltd., Brisbane. 33 kV metal-clad outdoor type reactors. (C.R.E. (I.B.) 59985/50. Ten/1478/I.B.1.)*

20th October. Brisbane City Council. 11 kV metal-clad oil-immersed ring main switchgear. (C.R.E. (I.B.) 60708/50. Ten/1494/I.B.)*

Birmingham.—23rd August. Regional Hospitals Board. Revision of mains and sub-mains distribution at Dudley Road Infirmary, Western Road, Birmingham, 18. City engineer, Civic Centre.

Bradford.—21st August. Town Council. Installation of electric lighting, heating and power, and of a single-speed electric passenger lift, at Waterworks Department, Darley Street. City architect, Town Hall.

Dagenham.—31st August. Borough Council. 600 V and 250 V underground cable. (See 4th August issue.)

Darlington.—Town Council. Electrical work in connection with the Salters Lane open-air school. Borough architect, Central Buildings.

Dudley.—23rd August. Town Council. Installation of electric lighting and power in Council houses (1,500 houses eventually involved). Borough architect, Priory Hall.

London.—18th October. Metropolitan Water Board. Two sets of electrically driven well and surface pumps for Chingford pumping station. (See this issue.)

Merton and Morden.—29th August. U.D.C. Stage lighting at Merton Public Hall. (See 4th August issue.)

Norway.—1st September. Nordland Fylke Elektrisitetskontoret, Bod. Electrical equipment for Niingen hydro-electric power plant. (C.R.E. (I.B.) 60390/50. Ten/1497/I.B.1.)*

Soke of Peterborough.—County Council. Electrical installation comprising feeder cable and associated switchgear at St. John's Close, Thorpe Road, Peterborough. Applications for forms by 14th August. (See this issue.)

Stockport.—25th August. General Purposes Committee. Supply of (1) time switches; (2) lanterns, chokes and capacitors for 80 W mercury vapour lighting; and (3) reinforced concrete lighting columns. (See 4th August issue.)

Swinton and Pendlebury.—26th August. Corporation. Concrete columns, lanterns, lamps, etc., for lighting Manchester-Chorley road. (See 4th August issue.)

Uruguay.—9th January, 1951. Usinas Electricas y Telefonos del Estado. Telephone equipment. (C.R.E. (I.B.) 60280/50. Ten/1483/I.B.2.)*

West Riding.—18th August. Standing Joint Committee. Rewiring constabulary headquarters in Back Bond Street, Wakefield. County architect, County Hall, Wakefield.

ORDERS PLACED

Acton.—Highways Committee. Recommended. Installation of street lighting in Sunbeam Road (£113) and Atlas Road (£155).—Revo Electric Co.

Coventry.—Corporation Education Committee. Renewal of lighting equipment at Technical College (£474).—Coventry Electrical Appliances, Ltd.

Electrical installation at new infants' department at Stivichall School (£1,922).—P. D. Brady.

Housing Committee. Flats at Stonebridge Highway, Allesley and Quinton Park housing estates (£7,797).—F. L. Flinn (acceptance recommended to G. Wimpey & Co., the contractors).

London.—L.C.C. Installation of electricity in 268 flats in Duke's Court, York Street Dwellings, Westminster, and Shelton Street Dwellings, Holborn.—Arthur Scull & Son.

METROPOLITAN WATER BOARD.—Modifications to switchboard, etc., at Hampton Works (£1,175).—Bertram Thomas (Engineers), Ltd. Electric lighting installation at Sunnyside pumping station (£969).—Carlin Engineering Co. Three 1,000 kVA transformers at Hammersmith pumping station (£5,140).—Bonar, Long & Co.

LEWISHAM.—Housing Committee. Recommended. Electrical work at Perry Vale No. 2 housing scheme (£4,447).—London Electricity Board.

Northumberland. — Education Committee. Electrical installation at Longbenton Unit No. 3 county primary school (£5,450).—Morris and Smiles, Wallsend.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Berwickshire.—Houses (82), on 13 sites, for C.C.; R. Martin, county clerk, Duns.

Birkenhead.—Factory for Vise Grip Products, Ltd.; Ormrod & Banister, architects, Cunard Buildings, Liverpool.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Blackburn.—Houses (84), Green Lane site; borough engineer.

New St. Stephens junior school; Thorpe & Whyman, architects, Oldham.

Bootle.—Houses for B.C.: Wood End Building, Co., Ltd. (24); J. Hughes (Liverpool), Ltd. (70); direct labour (78).

Bournemouth.—Rebuilding Metropole Hotel; Collins and Geens, architects, 15, Westover Road.

Bradford.—Houses (120), Bierley estate, for T.C.; John Laing & Son, Carlisle.

Burnley.—Nursery schools at Lionel Street, Whittlefield, and Stoneyholme; borough engineer.

Bungalows (40), Rossendale Road site; Unit Construction Co., Ltd., Knutsford, Ches.

Cheshire.—Fire stations at Macclesfield, Audlem, and Ellesmere Port; F. M. Parkes, county architect, Chester.

Clacton.—Junior school, Alton Park (£78,000); H. Conolly, county architect, County Hall, Chelmsford.

Cornwall.—College of technology, Trevenson (£95,000), and colleges of further education on eleven sites; county architect, County Hall, Truro.

Cumberland.—Police houses at various sites for C.C.; John Laing & Son, Carlisle.

Darlaston.—Houses, Wilkes Avenue, Bently (34) and at Morris Avenue (34); Shutt & Co., Ltd., Waterloo Road, Wolverhampton.

Derby.—Factory; Wallpaper Manufacturers, Ltd., Gresham Road.

Dudley.—Houses (164); borough surveyor.

"Gregory" type flats (60); J. Harper & Sons (Blackheath), Ltd., Birmingham.

Dukinfield.—Houses (36) for U.D.C.; Cruikshank & Seward, architects, 16, Princess Street, Manchester.

Edinburgh.—Factory extensions; Andersons (Edinburgh), Ltd., 33, Montgomery Street, Edinburgh, 7.

Halesowen.—Flats (46), Kent Road, Lapal; borough surveyor.

Hythe.—Additions and alterations to St. John's Hospital, High Street, for Trustees; Shambrook & Partners, architects, 96, Tontins Street, Folkestone.

Kenilworth.—Police station and court; county architect, Warwick.

Kidderminster.—County primary school, Birchen Coppice; F. W. B. Yorks and H. M. Barker, architects, 36, Calthorpe Road, Edgbaston, Birmingham.

Leicestershire.—Schools at Ashby-de-la-Zouch, Whitwick and Wigston Magna (£302,000), for E.C.; county architect, Grey Friars, Leicester.

London.—Reconstruction of demolished premises, Bedford Corner Hotel, 11, Bayley Street, W.C.1 (£80,000), for R. E. Jones, Ltd.; T. Mortimer Burrows and Partners, architects, 44, Bedford Row, W.C.1.

Blocks of flats (47 dwellings, laundry, etc.), Kennaway estate extension (£91,881) for L.C.C.; director of housing, County Hall, Westminster Bridge, S.E.1.

POPLAR.—Open-air school, Bow Road (£67,697) for L.C.C.; director of housing.

Luton.—Offices, stores, canteen, etc.; Three Star (Luton), Ltd., 187/195, Waller Road.

Notts.—Workshop block at Notts and District Joint Technical College (£50,000); county architect, Nottingham.

Nuneaton.—Bungalows (50), Ramsden Avenue; A. W. Hawksley, Ltd., Hucclescote, Glos.

Plymouth.—Shop, library, showrooms and offices, New George Street; W. H. Smith & Son, Ltd., Strand House, Portugal Street, W.C.2.

Portsmouth.—Maisonettes (69) and flats, Hale Street and Union Place, city architect.

Preston.—Houses (98), Ribbleton Hall estate; borough surveyor.

Runcorn.—Further 91 houses; U.D.C. surveyor.

Rushden.—Proposed reconstruction of Rushden Hall; Professor A. E. Richardson, Ampthill.

St. Helens (Lancs.).—Extensions to factory for Tootal Broadhurst Lee Co., Ltd., at Parr Trading estate; Wm. Thornton & Sons, Ltd., Liverpool.

Scarborough. — Houses (86), Eastfield; builders: E. Hunter, Ltd., Scarborough (20); F. C. Heptinstall, Scarborough (22); C. Coates, Ltd., Scarborough (24); and H. Newlove, builder, Scarborough (20).

Shotton (Flints.).—Home for the aged; deputy county architect, Llwynegrin, Mold.

Sittingbourne.—Six blocks of flats, Canterbury Road; U.D.C. surveyor.

Slough.—Dwellings (76), Priory estate, Burnham; borough architect.

Solihull.—Block of eight shops, with flats and maisonettes over, Cranmore Boulevard, Shirley, for U.D.C.; C. R. Hutchinson, surveyor, 90, Station Road.

Southgate.—Dwellings (42), Bramley Road/Reservoir Road site; borough engineer, Town Hall, Palmers Green, N.13.

Stretford.—Flats (84), Christie Road; borough engineer.

Swansea.—Houses (136), Gendros estate, section three; borough architect.

Walsall.—Houses for Town Council; F. A. & A. H. Taylor, Croxstall Road, Bloxwich (47), United Construction Co., Ltd., Walsall (33) and Sir Alfred McAlpine & Son, Ltd., Wolverhampton (41).

Watford.—Showrooms, workshops and offices, Lamb Yard, High Street; Benskins Watford Brewery, Ltd., 196, Lower High Street.

Wellingborough.—Houses (52), Croyland Hall Farm estate; U.D.C., engineer & surveyor.

West Sussex.—Schools, West Green, Crawley, and Sea Lane, Ferring; classrooms and laboratory, High School for Girls, Horsham; boarding accommodation and staff house, School Lane, Steyning; county architect, County Hall, Chichester.

West Hartlepool.—Houses (150) for T.C.; Hartlepools Master Builders' Association.

Widnes.—Dwellings (118), Crow Wood estate; T. A. Brittain, borough architect, Brendan House, Widnes Road.

Wigan.—Houses (16), Shevington, for R.D.C.; J. Gaskell & Sons, Orrell.

Willingdon.—Primary school for East Sussex C.C.; Ringmer Building Works, Ltd., Ringmer, Lewes.

Wolverhampton.—Houses (50), Tettenhall site, Sir A. McAlpine & Son, Ltd., Wolverhampton.